

Postdoctoral and Senior Postdoctoral
Resident Research Associateship Program
and Research Management Associateship Program

for the
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

STATUS REPORT NO. 88

June 1, 1986 to August 31, 1986

Contract NASW - 3458

Office of Scientific and Engineering Personnel
National Research Council
National Academy of Sciences - National Academy of Engineering
2101 Constitution Ave., N. W.
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NRC-NASA

STATUS REPORT NO. 88

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This report provides information on the status of all Resident Research Associates and Research Management Associates in this quarter. Part I lists alphabetically by laboratory all Associates whose tenure continued as of September 1, 1986; it includes their countries of citizenship and dates of tenure. Part I also includes those Associates who began tenure during this reporting period (indicated by an asterisk appearing before their names); information on these new Associates is provided in the following format:

*Name: Citizenship; dates of tenure; year of doctoral degree, institution granting doctorate, field of study; stipend; and title of research work.

Senior Associates are designated by an "S" following their names. For those Associates who renewed during this period, the renewal starting date is underscored, and the length of renewal and the amount of the renewal stipend are noted.

A "+" appears before the name of any Associate who has a special situation that does not follow the routine reports procedure. Detailed information on the situation is included in these special cases.

Part II of this report lists all Associates who terminated during the reporting period. The Associates are listed alphabetically by laboratory, with dates of tenure and name of their advisors.

Part II also shows whether Associates and advisers have met their reporting obligations. Associates and their advisers are required to write termination reports and final evaluations, respectively. Copies of such papers received during this period are included as an appendix to this report.

Part III provides an update of report information on Associates who terminated prior to this reporting period. Associates are listed alphabetically by laboratory.

Part IV is a list of Progress Reports received during this reporting period.

From the beginning of the Associateship Program in 1959, appointments have been held by 2,534 scientists from 65 countries (including "Stateless" status). In addition, some new appointees have not yet begun tenure.

During the three months covered by this report and on September 1, 1986, 178 Associates were on tenure, although they did not all start at the same time. Their distribution at NASA Centers is shown below.

	On tenure as of 6/01/86	On tenure as of 9/01/86
<u>AMES RESEARCH CENTER</u>	50	48
Dryden Flight Research Center	0	0
<u>EARTH RESOURCES LABORATORY</u>	1	0
<u>GODDARD SPACE FLIGHT CENTER</u>	39	41
Institute for Space Studies	2	2
Space Flight Center-Greenbelt	37	39
Wallops Flight Center	0	0
<u>JET PROPULSION LABORATORY</u>	36	35
<u>LANGLEY RESEARCH CENTER</u>	20	22
<u>LEWIS RESEARCH CENTER</u>	14	10
<u>LYNDON JOHNSON SPACE CENTER</u>	12	12
<u>MARSHALL SPACE FLIGHT CENTER</u>	8	9
<u>NASA HEADQUARTERS (RMA Program)</u>	1	1
	<u>181</u>	<u>178</u>
TOTALS	181	178

The Associates who were on tenure on September 1, 1986, are citizens of the following countries:

Argentina	2	Greece	1	Peru	1
Australia	1	India	16	Portugal	1
Austria	1	Iran	1	Sweden	2
Belgium	1	Israel	11	Switzerland	2
Canada	4	Italy	1	Taiwan (R.O.C.)	5
Columbia	1	Japan	11	Turkey	1
Denmark	1	Korea	4	United Kingdom	5
Finland	3	Mexico	1	United States	83
France	5	Netherlands	3	Venezuela	1
Germany, Federal		New Zealand	1	TOTAL	178
Republic of	6	Pakistan	2		

During the period of this report, 28 Associateships were renewed. The distribution of renewal appointments by NASA Center is shown below:

	<u>Renewals Offered</u>
Ames Research Center	9
Dryden Flight Res. Center	0
Earth Resources Laboratory	1
Goddard S. F. C. & I. S. S.	5
NASA Headquarters	0
Jet Propulsion Laboratory	5
Langley Research Center	3
Lewis Research Center	2
Lyndon Johnson Space Center	0
Marshall Space Flight Center	3
Wallops Flight Center	0
TOTAL	28

Part I

Associates on Tenure on September 1, 1986

AMES RESEARCH CENTER, Moffett Field, California

ADAIR, Desmond: United Kingdom; February 13, 1986-February 12, 1987.

*BARAM, Yoram (S): United States; June 25, 1986-June 24, 1987.
Ph.D. 1976, Massachusetts Institute of Technology, Electrical Engineering;
\$46,800; "System Identification for Large Space Structures: A Stochastic
Realization Approach."

*BOLES, Jennifer L.: United States; June 16, 1986-June 15, 1987.
Ph.D. 1985, Princeton University, Geology; \$26,350; "Precambrian
Stromatolite-Associated Metal Enrichments."

*BROWN, Jeffrey D.: United States; June 4, 1986-June 3, 1987.
Ph.D. 1986, University of California-Berkeley, Mechanical Engineering;
\$31,500; "An Experimental Study of Turbulent Boundary Layer Flow Applied
to Circulation-Control Airfoils."

*BUSHOUSE, Howard A.: United States; August 15, 1986-August 14, 1987.
Ph.D. 1986, University of Illinois-Urbana, Astronomy; \$26,350; "The
Infrared Properties of Interacting Galaxies."

CARBON, Duane F. (S): United States; January 6, 1986-January 5, 1987.

CHUNG, Song-Young: Korea; May 5, 1986-May 4, 1987

DEANS, Stanley R. (S): United States; October 1, 1984-September 30, 1986.

DOBROVOLSKIS, Anthony (S): United States; April 25, 1986-April 24, 1987.

+FREUND, Friedmann (S): Germany; March 11, 1985-July 20, 1987.
Split tenure from March 10, 1986, to July 21 1986.
Renewed for 12 months beginning July 21, 1986, at a stipend rate of
\$51,500.

*FUJII, Kozo (S): Japan; July 9, 1986-July 8, 1987.
Ph.D. 1980, University of Tokyo, Aeronautics; \$34,000; "Numerical
Computation of Three-Dimensional Vortical Transonic Flows."

*GALE, Joseph (S): Israel; August 20, 1986-August 19, 1987.
Ph.D. 1964, University of California-Davis, Water Science; \$50,000;
"Metabolic Rate During the Dark: A Limitation to Plant Productivity?"

GRUNWALD, Arthur J. (S): The Netherlands; September 3, 1985-September 2, 1986.

- *HARRIS, Bernard A. Jr.: United States; June 30, 1986-June 29, 1987.
Ph.D. 1985, Mayo Clinic, Rochester, MN, Internal Medicine; \$33,200; "The Role of Prostaglandin Assay."
- HERMANN, Robert (S): United States; October 1, 1984-September 30, 1986.
- +HEYMANN, Michael (S): Israel; August 1, 1983-October 22, 1986.
Split tenure (9 months) September 30, 1984-June 24, 1985, and October 11, 1985-June 1986.
Renewed for 4 months beginning June 23, 1986, at a stipend rate of \$49,440.
- INOUE, Osmu (S): Japan; April 8, 1985-April 7, 1987.
- *JAKOBSEN, Anne M.: Denmark; July 15, 1986-July 14, 1987.
Ph.D. 1981, University of Aarhus, Denmark, Astrophysics; \$29,750;
"Boundary Conditions and Constraints on Star Formation Theory by Well Determined Properties of Young Open Stellar Clusters, and Implementation of These Constraints."
- JOHNSON, Walter William: United States; April 7, 1986-April 6, 1987.
- KANAVARIOTI, Anastassia: Greece; January 15, 1985-January 14, 1987.
- KANKI, Barbara G.: United States; October 21, 1985-October 20, 1986.
- KAWAMURA, Tetuya: Japan; October 24, 1985-October 23, 1986.
- *KEEFE, Laurence R.: United States; June 2, 1986-June 1, 1987.
Ph.D. 1984, University of Southern California, Aerospace; \$32,350;
"Analysis of Numerically Simulated Turbulence Using Dynamical Systems Theory."
- LARIMER, James (S): United States; January 23, 1986-January 22, 1987.
- LASSILA, David H.: United States; December 13, 1984-December 12, 1986.
- LEE, DUCKJOO: Korea; August 20, 1985-August 19, 1987.
Renewed for 12 months beginning August 20, 1986, at a stipend rate of \$33,350.
- LEE, Moon Joo: Korea; November 25, 1985-November 24, 1986.
- LIFSHITZ, Jacob M. (S): Israel; August 1, 1985-July 31, 1987.
Renewed for 12 months beginning August 1, 1986, at a stipend rate of \$51,500.
- LINDNER, Bernhard L.: United States; June 21, 1985-June 20, 1987.
Renewed for 12 months beginning June 21, 1986, at a stipend rate of \$27,200.
- +MERHAV, Shmuel J. (S): Israel; September 4, 1984-October 8, 1986.
Split tenure October 3, 1985-July 1, 1986.
Renewed for 3 months beginning July 9, 1986, at a stipend rate of \$50,000.

OWENSON, Brian D.: United States; June 17, 1985-June 16, 1987.
 Renewed for 12 months beginning June 17, 1986, at a stipend rate of \$27,200.

PALMISANO, Anna C.: United States; November 4, 1985-November 3, 1986.

PETTERSSON, Lars: Sweden; September 23, 1985-September 22, 1986.

PINTO, Joseph (S): United States; May 20, 1985-May 19, 1987.

RUMMEL, John D.: United States; January 7, 1985-January 6, 1987.

SANDFORD, Scott A.: United States; January 10, 1986-January 9, 1987.

SHOWALTER, Mark R.: United States; January 7, 1986-January 6, 1987.

SINGHAL, Rajendra (S): India; February 1, 1985-January 31, 1987.

SINTON, Douglas M.: United States; July 2, 1984-July 1, 1987.
 Renewed for 12 months beginning July 2, 1986, at a stipend rate of \$28,050.

*STAN-LOTTER, Helga (S): Germany; May 8, 1986-May 7, 1987.
 Ph.D. 1975, Technical University, Munich, Biochemistry; \$38,000;
 "Structural Comparisons of F₁Adenosine Triphosphatases from Eubacteria and Archaeobacteria."

STOKER, Carol R.: United States; October 15, 1985-October 14, 1986.

THOMPSON, Kevin W.: United States; June 6, 1985-June 5, 1987.
 Renewed for 12 months beginning June 6, 1986, at a stipend rate of \$27,200.

VANAJAKSHI, C. T.: Canada; April 4, 1985-April 3, 1987.

VELGER, Mordekhai: Israel; May 29, 1985-May 28, 1987.

VERHAEGEN, Michael H.: Belgium; December 18, 1985-December 17, 1986.

WESTMAN, Walter E. (S): United States; October 1, 1985-September 30, 1986.

WOLFIRE, Mark: United States; November 12, 1985-November 11, 1986.

ZAHNLE, Kevin J.: United States; September 16, 1985-September 15, 1986.

EARTH RESOURCES LABORATORY

None at this time

GODDARD INSTITUTE FOR SPACE STUDIES, New York, New York

CABOT, William Henry: United States; February 3, 1986-February 2, 1987.

CARLSON, Barbara E.: United States; September 4, 1984-September 3, 1986.

GODDARD SPACE FLIGHT CENTER, Greenbelt, Maryland

ACHARYA, Bannaje S.: India; November 1, 1984-October 31, 1986.

BARNARD, John: United States; September 17, 1984-September 16, 1986.

BARTHELMY, Scott: United States; July 21, 1985-July 20, 1987.
Renewed for 12 months beginning July 21, 1986, at a stipend rate of \$27,200.

*BECKER, Francois (S): France; August 27, 1986-August 26, 1987.
Ph.D. 1967, Paris-Sud, Orsay, France, Theoretical Physics; \$53,000;
"Determination of Land Surface Parameters and Fluxes from Satellite Data."

BJORAKER, Gordon Lee: United States; May 3, 1985-May 2, 1987.

BUERGI, Alfred: Switzerland; September 2, 1985-November 30, 1986.

CROWLEY, Thomas J. (S): United States; February 3, 1986-February 2, 1987.

DESERT, Francois-Xavier: France; February 5, 1986-February 4, 1987.

*ELITZUR, Moshe (S): Israel; August 15, 1986-August 14, 1987.
Ph.D. 1971, Weizmann Institute of Science, Israel, Theoretical Physics;
\$43,500; "Theoretical Astrophysics Research."

*ELSWORTH, Kirk A.: United States; August 26, 1986-August 25, 1987.
Ph.D. 1985, University of California-Los Angeles, Geophysics; \$26,350;
"Two Layer Convection with Temperature-Dependent Viscosity."

*ERICKSON, Gary Michael: United States; June 28, 1986-June 27, 1987.
Ph.D. 1985, Rice University, Space Physics; \$26,350; "Self-Consistent
Modeling of Slow Convection in the Earth's Magnetosphere."

GOETZ, Francois: Switzerland; December 20, 1984-December 19, 1986.

+GRAYZECK, Edwin J. (S): United States; September 3, 1985-July 31, 1987.
Split tenure from March 2, 1986, to June 1986.
Renewed for 12 months beginning August 1, 1986, at a stipend rate of \$41,200.

HAKKINEN, Sirpa, M. A.: Finland; June 1, 1985-May 31, 1987.
Renewed for 12 months beginning June 1, 1986, at a stipend rate of \$27,200.

- *HOSHINO, Masahiro: Japan; August 1, 1986-July 31, 1987.
Ph.D. 1986, University of Tokyo, Science; \$26,350; "Large Amplitude MHD Waves Upstream of Collisionless Shock."
- HYDE, William: Canada; March 3, 1986-March 2, 1987
- *JAHODA, Keith Michael: United States; July 28, 1986-July 27, 1987.
Ph.D. 1980, University of Wisconsin-Madison, Physics; \$26,350; "XTE Proportional Counter Studies and SSS Studies of the ISM."
- KUNIEDA, Hideyo: Japan; February 24, 1986-February 23, 1987.
- LEISAWITZ, David T.: United States; October 30, 1985-October 29, 1986.
- LEVINE, Elissa R.: United States; March 3, 1986-March 2, 1987.
- *MADEJSKI, Grzegorz M.: United States; June 16, 1986-June 15, 1987.
Ph.D. 1986, Harvard University, Astronomy; \$26,350; "Study of X-ray Emission from Active Galactic Nuclei and Development of Spectroscopic Instruments for X-ray Astronomy."
- MAEZAWA, Kiyoshi (S): Japan; July 1, 1985-September 30, 1986.
Renewed for 3 months beginning July 1, 1986, at a stipend rate of \$36,000.
- MARTENS, Petrus C. H.: The Netherlands; September 26, 1984-September 25, 1986.
- MITCHELL, Kenneth: United States; September 30, 1985-September 29, 1986.
- O'CONNOR, William P.: United States; January 22, 1985-January 21, 1987.
- *OPPENHEIM, Uri P. (S): Israel; August 1, 1986-July 31, 1987.
Ph.D. 1951, Hebrew University, Physics; \$53,000; "New Laser Lines of Asymmetric CO₂."
- OZEL, Mehmet E. (S): Turkey; February 10, 1986-February 9, 1987.
- PERKO, John S.: United States; December 21, 1984-December 20, 1986.
- PERSIC, Massimo: Italy; July 15, 1985-July 14, 1987.
Renewed for 12 months beginning July 15, 1986, at a stipend rate of \$27,200.
- PRASAD, Coorg R. (S): India; March 4, 1986-March 3, 1987.
- ROBERT, D. Aaron: United States; January 15, 1986-January 14, 1987.
- *ROMANI, Paul N.: United States; August 1, 1986-July 31, 1987.
Ph.D.; University of Michigan-Ann Arbor, Atmospheric Science; \$26,350; "A Comparison of Gas Compositions in the Atmospheres of Jupiter and Saturn from Voyager Infrared Spectra to Model Calculations."
- SCHAEFER, Robert K.: United States; September 3, 1985-September 2, 1986.

TORRES, Ana V.: Mexico; March 3, 1986-March 2, 1987.

VAN DE GRIEND, Adriaan: The Netherlands; October 1, 1985-September 30, 1986.

VENKATESH, Y. V. (S): India; October 1, 1985-September 30, 1986.

VRTILEK, Saega D.: Pakistan; January 6, 1986-January 5, 1987.

*WELCH, John N. (S): United States; June 2, 1986-June 1, 1987.

Ph.D. 1985, University of Maryland-College Park, Computer Science;
\$48,500; "Query Decomposition of Multiple Queries on NASA's Heterogeneous
Database."

ZUBER, Maria T.: United States; October 28, 1985-October 27, 1986.

JET PROPULSION LABORATORY, Pasadena, California

ANCELLET, Gerard M.: France; January 22, 1985-January 21, 1987.

BERATAN, David N.: United States; July 8, 1985-July 7, 1987.

Renewed for 12 months beginning July 8, 1986, at a stipend rate of \$27,200.

BERTHIAS, Jean-Paul A.: France; September 17, 1985-September 16, 1986.

BOULANGER, Francois B.: France; February 1, 1985-January 31, 1987.

*BRINCA, Armando (S): Portugal; August 29, 1986-August 28, 1987.

Ph.D. 1978, I. S. Tecnico, Lisbon, Electrical Engineering; \$45,000;
"Geotail Hydromagnetic Waves: Finite-Geometry, Convection and Nonlinear
Effects."

*COHILL, Thomas P. (S): United States; June 2, 1986-June 1, 1987.

Ph.D. 1968, Penn State University, Biophysics; \$50,000; "Synergistic
Effects of Mixed Radiation Exposure of the Nematode C. elegans."

DENISON, Arthur B. (S): United States; January 6, 1986-September 5, 1986.

ELVIDGE, Christopher D.: United States; April 8, 1985-April 7, 1987.

*GOGUEN, Jay D.: United States; June 16, 1986-June 15, 1987.

Ph.D. 1981, Cornell University, Astronomy; \$28,900; "Modeling Infrared and
Visible Wavelength Photometry and Polarimetry of Solar System Surfaces."

GONZALEZ-ALARCON, Walter (S): Peru; November 11, 1985-November 10, 1986.

HALPERN, Leopold E. (S): Austria; April 16, 1986-April 15, 1987.

HATAKEYAMA, Shiro (S): Japan, November 20, 1985-November 19, 1986.

HEILIGMAN, Gary M.: United States; September 5, 1984-September 4, 1986.

HERMAN, Gary A.: Australia; November 7, 1985-November 6, 1986.

HIGDON, James C. (S): United States; February 1, 1985-January 31, 1987.

HOUGH, David H.: United States; April 1, 1986-March 31, 1987.

ISRAELSSON, Ulf E.: Sweden; November 6, 1985-November 5, 1986.

JAMES, Geoffrey Kurt: United Kingdom; January 30, 1986-January 29, 1987.

KRISHNAKUMAR, E.: India; May 2, 1985-May 1, 1987.

MAWHORTER, Richard J.: United States; June 13, 1985-June 12, 1987.

Renewed for 12 months beginning June 13, 1986, at a stipend rate of \$27,200.

MAY, Randy Dean: United States; April 24, 1985-April 23, 1987.

MAYNARD, Nancy G. (S): United States; September 3, 1985-September 2, 1986.

MCEWAN, Murray J. (S): New Zealand; November 25, 1985-November 24, 1986.

MCRAE, Glenn A.: Canada; January 23, 1985-January 22, 1987.

POLSTORFF, Juergen: West Germany; October 22, 1984-October 21, 1986.

POPE, Kevin O.: United States; December 3, 1985-December 2, 1986.

RAITALA, Jouko T.: Finland; April 29, 1985-April 28, 1987.

RAMESHAM, Rajeshuni: India; October 31, 1985-October 30, 1986.

SALO, Joukp H.: Finland; December 2, 1985-December 1, 1986.

SHAMIR, Jacob (S): Israel; July 1, 1985-September 30, 1986.

Renewed for 3 months beginning July 1, 1986, at a stipend rate of \$50,000.

STOLZ, John F.: United States; September 28, 1984-September 27, 1986.

*TSO, Tai-Ly: United States; June 30, 1986-June 29, 1987.

Ph.D. 1984, University of California-Irvine, Physical Chemistry; \$27,200;
Study of the Chemical Reactivity of Reaction Intermediate and the
Development of its Detection System."

VOGELMANN, James E.: United States, November 6, 1984-November 5, 1986.

WENKERT, Daniel: United States; October 9, 1985-October 8, 1986.

WOODWARD, Martin: United States; July 2, 1985-July 1, 1987.

Renewed for 12 months beginning July 2, 1986, at a stipend rate of \$27,200.

LANGLEY RESEARCH CENTER, Hampton, Virginia

ANDERSON, Iris Cofman: United States; September 12, 1984-September 11, 1986.

*BUONCRISTIANI, Alfred M. (S): United States; June 2, 1986-June 1, 1987.
Ph.D. 1966, University of Notre Dame, Physics; \$45,000; "A Study of
Non-Radiative Processes in Tunable Solid State Laser Materials."

CRILL, Patrick M.: United States; September 12, 1984-September 11, 1986.

DAUDPOTA, Q. (S): Pakistan; June 10, 1985-June 9, 1987.
Renewed for 12 months beginning June 10, 1986, at a stipend rate of
\$36,565.

GHAEMMAGHAMI, Peiman: Iran; August 20, 1985-August 19, 1987.
Renewed for 12 months beginning August 20, 1986, at a stipend rate of
\$33,200.

HARTMAN, Jean M.: United States; December 3, 1984-December 2, 1986.

HARTWICH, Peter-Michael: West Germany; June 18, 1984-September 30, 1986.
Renewed for 3 1/2 months beginning June 18, 1986, at a stipend rate of
\$27,200.

HUANG, Lein-Saing: United States; March 31, 1986-March 30, 1987.

ISHII, Katsuya: Japan; September 16, 1985-September 15, 1986.

KISHONI, Doron: Israel; March 11, 1984-March 10, 1987.

KUMAR, Devendra (S): India; April 3, 1986-April 2, 1987.

*MAITI, Sukumar (S): India; August 18, 1986-August 17, 1987.
Ph.D. 1968, Calcutta University, Calcutta, Physical Chemistry; \$43,000;
"Novel High Temperature Composite Matrices."

MORTON, John (S): United Kingdom; January 6, 1986-October 5, 1986.

NAIDU, Desineni S. (S): India; January 11, 1985-January 10, 1987.

RAMANA, Munagala V.: India; January 2, 1985-January 1, 1987.

REBSTOCK, Rainer: West Germany; May 23, 1986-May 22, 1987.

REDDY, N. M. (S): India; October 15, 1985-October 14, 1986.

SANCHEZ-CAMPEROS, Edgar N.: Columbia; January 7, 1985-January 6, 1987.

*STUHLMANN, Rolf: Germany; June 13, 1986-June 12, 1987.
Ph.D. 1985, University of Cologne, Meteorology; \$26,350; "Determination of
the Inter Annual Variability of the ERB and an Approach to Estimate
Globally the Radiative Heating Cooling of the Atmosphere."

*SUN, Keun J.: Taiwan; August 1, 1986-July 31, 1987.

Ph.D. 1986, University of Wisconsin-Milwaukee, Physics; \$26,350.

"Acoustic Waveguide for Monitoring Curing Process."

*WELLER, Tanchum (S): Israel; August 25, 1986-August 24, 1987.

Ph.D. 1986, Technion, Israel Institute of Technology, Haifa, Aeronautics;
\$45,000; "Evaluation of Advanced New Design Concepts and Technologies for
Large Primary Composite Structures."

WOLF, Stephen: United Kingdom; April 1, 1985-March 31, 1987.

LEWIS RESEARCH CENTER, Cleveland, Ohio

BANSAL, Narottam P. (S): India; September 30, 1985-September 30, 1986.

Extended 1 day.

CHAO, David F.: Taiwan; September 4, 1984-September 3, 1986.

CHEN, Chiun-Hsun: Taiwan; September 3, 1985-September 2, 1986.

CHOPRA, Mona A.: India; September 10, 1984-September 9, 1986.

HATTORI, Shuji: Japan; September 25, 1985-September 24, 1986.

*LOCCI, Ivan E.: Venezuela; July 7, 1986-July 6, 1987.

Ph.D. 1986, Case Western Reserve University, Metallurgy; \$31,500;

"TRM Observations of Rapidly Solidified Crystalline Materials."

*MAJUMDAR, Bankim C. (S): India; August 4, 1986-August 3, 1987.

Ph.D. 1970, Indian Institute of Technology, Kharagpur, Mechanical
Engineering; \$44,000; "Deformation and Thermal Effects on Dynamically
Loaded Bearings."

SARMA, Garimella (S): India; May 6, 1985-May 5, 1987.

SIMONS, Rainee: Israel; August 8, 1985-August 7, 1987.

Renewed for 12 months beginning August 8, 1986, at a stipend rate of
\$32,350.

VALISETTY, Ramakrishna: India; May 1, 1985-June 30, 1987.

Renewed for 12 months beginning July 1, 1986, at a stipend rate of \$33,200.

LYNDON B. JOHNSON SPACE CENTER, Houston, Texas

*BEARD, James S.: United States; August 15, 1986-August 14, 1987.

Ph.D. 1985, University of California-Davis, Geology; \$27,200;

"Petrogenesis of Tonalite in the Smartville Complex, Sierra Nevada,
California."

CARR, Robert H.: United Kingdom; October 1, 1985-September 30, 1986.

COHLY, Hari H. P.: Canada; February 3, 1986-February 2, 1987.

COLSON, Rossell O.: United States; February 24, 1986-February 23, 1987.

DASCH, E. Julius (S): United States; September 2, 1985-September 1, 1986.

*GIBBS, Allan K. (S): United States; August 1, 1986-July 31, 1987.
Ph.D. 1980, Harvard University, Geology; \$34,000; "Archean Crustal
Evolution in the Amazonian Craton."

HOWERTON, Thomas C.: United States; March 1, 1985-February 28, 1987
Please note that Dr. Howerton was reported as terminated in our report #86.

KALMAZ, Ekrem Erroll (S): United States; April 2, 1984-October 1, 1986.

MING, Douglas W.: United States; January 6, 1986-January 5, 1987.

MITTFELDEHLDT, David W. (S): United States; September 23, 1985-
September 22, 1986.

MORGAN, Thomas H. (S): United States; May 12, 1986-May 11, 1987.

SAMS, Clarence F.: United States; October 1, 1984-September 30, 1986.

MARSHALL SPACE FLIGHT CENTER, Huntsville, Alabama

*ADENIJI-FASHOLA, Adeyemo A.: Nigeria; August 25, 1986-August 24, 1987.
Ph.D. 1981, University of Toronto, Canada, Mechanical Engineering;
\$31,500; "Momentum and Energy Transport in the Forced Flow of
Compressible Fluids Through Non-Standard Geometries."

AN, Chang-Hyuk: Korea; October 15, 1984-October 14, 1986.

CHEN, Chien-Pin: Taiwan; October 1, 1984-September 30, 1986.

*FONTENLA, Juan M.: Argentina; August 13, 1986-August 12, 1987.
Ph.D. 1985, University of Buenos Aires-Capital, Astrophysics; \$26,350;
"Solar Prominences Investigation by Using UV Data From the SMM."

HWANG, Kai-Shen: Taiwan; January 7, 1985-January 6, 1987.

MACHADO, Marcos E. (S): Argentina; August 5, 1985-February 4, 1987.
Renewed for 6 months beginning August 5, 1986, at a stipend rate of
\$34,505.

MIYAJI, Shigeki: Japan; September 3, 1985-September 2, 1986.

PORTER, Jason G.: United States; June 18, 1984-October 17, 1986.
Renewed for 4 months beginning June 18, 1986, at a stipend rate of
\$27,200.

*YOSHIMURA, Hirokazu (S): Japan; July 15, 1986-July 14, 1987.
Ph.D. 1972, University of Tokyo, Astronomy; \$42,000; "Numerical
Simulation of Dynamics of Horizontal Magnetic Flux Tubes Embedded in
Turbulent Convection."

NASA HEADQUARTERS, Washington, D. C. (Research Management Associateship
Program)

SYLVESTER, Paul J.: United States; March 26, 1984-March 25, 1987.
Dr. Sylvester transferred March 26, 1986, from Johnson Space Center
NASA Headquarters to terminate his tenure.

PART II

ASSOCIATES WHO TERMINATED DURING THIS PERIOD

June 1, 1986, through August 31, 1986

AMES RESEARCH CENTER, Moffett Field, California

BLACKBURN, Thomas E.: United States; July 10, 1984-July 9, 1986.

Adviser: Dr. M. Lowenstein

Termination Report received; Adviser Evaluation overdue

CASTELAZ, Michael W.: United States; October 11, 1984-August 19, 1986.

Adviser: Dr. Michael W. Werner

Termination Report received; Adviser Evaluation overdue

+COHEN, Yehuda (S): Israel; August 14, 1984-August 31, 1986.

Adviser: Dr. David J. Desmarais

Split tenure from March 13, 1986, to June 25, 1986

Termination Report overdue; Adviser Evaluation overdue

EWEL, Katherine C. (S): United States; January 21, 1986-July 20, 1986.

Adviser: Dr. James G. Lawless

Termination Report received; Adviser Evaluation received

FUKUNISHI, Yu: Japan; September 17, 1984-June 30, 1986.

Adviser: Dr. D. A. Johnson

Termination Report received; Adviser Evaluation received

HALPRYN, Bruce M.: United States; June 27, 1983-June 26, 1986.

Adviser: Dr. Harold Sandler

Termination Report received; Adviser Evaluation received

KATZ, Joseph (S): Israel; July 30, 1984-August 29, 1986.

Renewed for 1 months beginning July 30, 1986

Adviser: Dr. D. G. Koenig

Termination Report received; Adviser Evaluation received

KRISTJANSSON, Hordur: Iceland; February 29, 1984-August 31, 1986.

Adviser: Dr. Lawrence I. Hochstein

Termination Report received; Adviser Evaluation overdue

LAMB, Susan A. (S): United States; December 12, 1985-August 11, 1986.

Adviser: Dr. Michael W. Werner

Termination Report overdue; Adviser Evaluation overdue

MANCINNELI, Rocco L.: United States; July 6, 1984-July 5, 1986.

Adviser: Dr. Lawrence I. Hochstein

Termination Report received; Adviser Evaluation overdue

WENZEL, Elizabeth M.: United States; November 15, 1984-August 27, 1986.
 Adviser: Dr. David C. Nagel
 Termination Report received; Adviser Evaluation overdue

ZABARA, Jacob (S): United States; August 27, 1984-August 26, 1986.
 Adviser: Dr. Nancy Daunton
 Termination Report received; Adviser Evaluation overdue

EARTH RESOURCES LABORATORY

LIEBERMAN, Milton E. (S): United States; June 1, 1985-August 31, 1986.
 Renewed for 3 months beginning June 1, 1986, at a stipend rate of \$43,000.
 Adviser: Dr. Armond T. Joyce
 Termination Report overdue; Adviser Evaluation received

GODDARD INSTITUTE FOR SPACE STUDIES, New York, NY

None this reporting period

GODDARD SPACE FLIGHT CENTER, Greenbelt, Maryland

ADELMAN, Saul J. (S): United States; August 1, 1984-July 31, 1986.
 Adviser: Dr. David S. Leckrone
 Termination Report received; Adviser Evaluation overdue

DERMER, Charles D.: United States; July 25, 1984-July 24, 1986.
 Adviser: Dr. Reuven Ramaty
 Termination Report received; Adviser Evaluation overdue

KAUFMAN, Michele (S): United States; January 21, 1986-June 20, 1986.
 Adviser: Dr. T. P. Stecher
 Termination Report received; Adviser Evaluation overdue

KOSUGI, Takeo: Japan; April 1, 1985-June 30, 1986.
 Adviser: Dr. Brian R. Dennis
 Termination Report received; Adviser Evaluation

MASSMAN, William J. (S): United States; April 1, 1985-August 29, 1986.
 Adviser: Dr. Eugenia Kalney
 Termination Report received; Adviser Evaluation overdue

PALUMBO, Giorgio G. C.: Italy; August 29, 1985-August 28, 1986.
 Adviser: Dr. E. Boldt
 Termination Report overdue; Adviser Evaluation overdue

VATHSAL, Srinivasan (S): India, June 15, 1984-June 14, 1986.
 Adviser: Dr. A. J. Fuchs
 Termination Report received; Adviser Evaluation overdue

VOORHIES, Coerte Van: United States; August 30, 1984-August 15, 1986.
 Adviser: Dr. Robert Allan Langel
 Termination Report received; Adviser Evaluation received

JET PROPULSION LABORATORY, Pasadena, California

JONES, Dayton L.: United States; July 30, 1984-July 27, 1986.
 Adviser: Dr. Robert A. Preston
 Termination Report received; Adviser Evaluation received

LYELL, Margaret J.: United States; May 7, 1984-August 6, 1986.
 Adviser: Dr. T. G. Wang
 Termination Report received; Adviser Evaluation overdue

PAIGE, David A.: United States; August 8, 1985-August 7, 1986.
 Adviser: Dr. Daniel J. McCleese
 Termination Report received; Adviser Evaluation overdue

SHARMA, Pramod K. (S): India; August 13, 1984-August 12, 1986.
 Adviser: Dr. Stephanopoul Flytzian
 Termination Report overdue; Adviser Evaluation overdue

TOON, Geoffrey C.: United Kingdom; June 11, 1984-July 10, 1986.
 Renewed for 1 month beginning June 11, 1986
 Adviser: Dr. C. B. Farmer
 Termination Report received; Adviser Evaluation overdue

LANGLEY RESEARCH CENTER, Hampton, Virginia

MILES, Thomas: United States; June 4, 1984-June 3, 1986.
 Adviser: Dr. W. L. Grose
 Termination Report received; Adviser Evaluation overdue

SNYDER, Melvin H. (S): United States; August 1, 1985-July 31, 1986.
 Adviser: Dr. L. J. Williams
 Termination Report received; Adviser Evaluation overdue

WILSON, John O.: United States; November 19, 1984-August 18, 1986.
 Adviser: Dr. Robert C. Harriss
 Termination Report received; Adviser Evaluation overdue

LEWIS RESEARCH CENTER, Cleveland, Ohio

HEBSUR, Mohan G.: India; January 16, 1984-July 15, 1987.
 Adviser: Dr. Robert V. Mince
 Termination Report received; Adviser Evaluation received

KATO, Kohji (S): Japan; August 26, 1985-August 25, 1986.
 Adviser: Dr. Donald H. Buckley
 Termination Report received; Adviser Evaluation overdue

LAI, Chun-Liang: Taiwan; June 19, 1984-August 26, 1986.

Adviser: Dr. An-Ti Chai

Termination Report received; Adviser Evaluation received

MANORY, Rafael R.: Israel; July 15, 1985-July 14, 1986.

Adviser: Dr. Donald H. Buckley

Termination Report received; Adviser Evaluation received

NIR, Dan (S): Israel; August 1, 1984-July 31, 1986.

Adviser: Dr. Robert V. Miner

Termination Report received; Adviser Evaluation received

TEWARI, Surendra Nath (S): India; January 4, 1984-June 3, 1986.

Adviser: Dr. H. H. Grimes

Termination Report received; Adviser Evaluation received

LYNDON B. JOHNSON SPACE CENTER, Houston, Texas

COHN, Judith D.: United States; September 4, 1984-July 31, 1986.

Adviser: Dr. G. R. Taylor

Termination Report overdue; Adviser Evaluation received

MURALI, Ahobila V. (S): India; June 18, 1984-June 17, 1986.

Adviser: Dr. Douglas B. Blanchard

Termination Report received; Adviser Evaluation received

MARSHALL SPACE FLIGHT CENTER, Huntsville, Alabama

PUSEY, Marc Lee: United States; March 1, 1984-August 29, 1986.

Adviser: Dr. Robert S. Snyder

Termination Report received; Adviser Evaluation overdue

REINLEITNER, Lee A.: United States; June 7, 1984-August 1, 1986.

Renewed for 3 months beginning June 6, 1986

Resigned August 1, 1986.

Adviser: Dr. Jack Hunter Waite

Termination Report received; Adviser Evaluation overdue

NASA HEADQUARTERS, Washington, D. C. (Research Management Associateship Program)

None this reporting period

PART III

Overdue Reports Received this Quarter

AMES RESEARCH CENTER

None this reporting period

GODDARD SPACE FLIGHT CENTER

KAUFL, Hans U.
NEWMAN, Paul A.

JET PROPULSION LABORATORY

SCHWARTZ, Richard Alan

LANGLEY RESEARCH CENTER

None this reporting period

LEWIS RESEARCH CENTER

None this reporting period

MARSHALL SPACE FLIGHT CENTER

None this reporting period

JOHNSON SPACE FLIGHT CENTER

None this reporting period

Part IV

PROGRESS REPORTS

Associates are required to submit a short Progress Report after six months of tenure. The following is a list of Reports received this quarter:

AMES RESEARCH CENTER

ADAIR, Desmond
CARBON, Duane F.
LAMB, Susan A.
LARIMER, James
SANDFORD, Scott A.
SCHOWALTER, Mark R.
VERHAEGEN, Michael
WOLFIRE, Mark G.

GODDARD INSTITUTE FOR SPACE STUDIES

CABOT, William H.

GODDARD SPACE FLIGHT CENTER

CROWLEY, Thomas J.
DESERT, Francois-Xavier
HYDE, William
KUNIEDA, Hideyo
LEVINE, Elissa
OZEL, Mehmet E.
ROBERTS, D. Aaron
TORRES, Ana V.
VRTILEK, Saega D.

JET PROPULSION LABORATORY

JAMES, Geoffrey K.
POPE, Kevin O.
SALO, Jouko Heikki

LANGLEY RESEARCH CENTER

MORTON, John

LEWIS RESEARCH CENTER

None this reporting period

LYNDON JOHNSON SPACE CENTER

MING, Douglas W.

MARSHALL SPACE FLIGHT CENTER

None this reporting period

NASA HEADQUARTERS

None this reporting period

ATTACHMENT I
Termination Reports

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AUG 4 1986

Termination Report

Thomas E. Blackburn

August 1, 1986

ASSOCIATESHIP
OFFICE

NASA/AMES RESEARCH CENTER
MS 245-5
Moffett Field, CA 94035

July 9, 1984
to July 9, 1986

Research Advisor; Max Loewenstein

Travel on Tenure;

1. American Geophysical Union, San Francisco, Dec 3-7, 1984.
2. Western Spectroscopy Association, Asilomar, CA, Jan 30-Feb 1, 1985.
3. American Geophysical Union, Baltimore, MD, May 27-30, 1985.
4. Free Radicals Conference, Granby, CO, Aug 17-25, 1985.
5. American Geophysical Union, San Francisco, CA, Dec 9-13, 1985.
6. Western Spectroscopy Association, Asilomar, CA, Jan 29-31, 1986.
7. Molecular Spectroscopy Conference, Columbus, OH, Jun 15-19, 1986.

Publications;

1. "Diode Laser Measurements of Line Strengths and Widths in the 4.5μ Bands of N_2O ", J. Quant. Spec. Radia. Trans., 35, 3 pgs 231-235. 1986, by M. Loewenstein, J.R. Podolske, T.E. Blackburn and P. Varanasi.
2. OCS presentation at 41-st symposium on Molecular Spectroscopy "Determination of the OCS 2062 cm^{-1} Fundamental Band Strength from Diode Laser Measurements." This work will be published in the near future.

Work in Progress;

1. OCS spectroscopy is continuing for the above publication.
2. CO instrument science for the Stratosphere-Troposphere Exchange Project (STEP) mission, instrument development and support through the January, 1987 Australian deployment.

Future Position;

To be held on contract at NASA/AMES to see the STEP project through its January 1987 deployment to Darwin, Australia. Contract is through The San Jose State University Foundation, with a renewal on December 31, 1986, and will end June 30, 1987. Mailing address is as above.

Research Summary;

1. N_2O spectroscopy, a remeasurement of the 4.5 micron bands done for the first time using diode lasers. This result is

usefull in clarifying the N_2O spetra for satelite surveys. The work was suggested by Prasad Varanasi, from Stonybrook, NY, and carried out at NASA/AMES.

2. OCS line spectroscopy in support of its detection feasibility. The feasability of measuring OCS was demonstrated indirectly by measuring realistic CO concentrations plus our in lab measurements of both the OCS and CO strengths of absorbing lines most likely to be used.

3. Developement of gas flow system and calibration methods for in-situ CO measuring spectrometer, utilizing diode lasers. This type of system can be converted in a staight-forward way for other gas measurements such as OCS, methane, etc.

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JUL 26 1986

ASSOCIATESHIP
OFFICE

NRC Regular Research Associate Termination Report

Name: Michael W. Castelaz

Date: July 18, 1986

Place of Tenure: NASA Ames Research Center

Research Advisor: Dr. Michael Werner

Dates of Tenure: October 10, 1986 - August 19, 1986

Travel during tenure:

Date	Place	Purpose
1/13-1/16/85	University of AZ Tucson, AZ	Presentation of a paper on IR reflection nebulae at the 165th meeting of the American Astronomical Society
1/31-2/7/85	NASA-Infrared Telescope Facility Mauna Kea, HI	Meeting and consultation with Dr. Grasdalen, Dr. K. Strom, Dr. S. Strom, and Dr. Tollestrup, regarding our study of IR reflection nebulae associated with bipolar mass outflow
4/8-12/85	Institute for Astronomy Honolulu, HI	Meeting with Dr. Capps in collaborative effort on our IR spectropolarimetric project
5/23-30/85	NASA-Infrared Telescope Facility Mauna Kea, HI	Near-IR polarization observations made at the IRTF with Dr. Werner, Dr. Ellis, and Dr. Capps
9/30-10/4/85	Jet Propulsion Lab Pasadena, CA	Image processing of IRAS data at the IRAS Processing and Analysis Center
12/2-7/85	NASA-Infrared Telescope Facility Mauna Kea, HI	Spectropolarimetric observations made at the IRTF in collaboration with Dr. Werner, Dr. Ellis, Dr. Pendleton, and Dr. Capps
1/5-9/86	Rice University Houston, TX	Presentation made at the 167th meeting of the American Astronomical Society of our analysis of the images of the reflection nebulae in the Pleiades
2/11/86	NASA-Ames Research Center Moffett Field, CA	Gave a seminar on the infrared properties of the Pleiades reflection nebulae

6/17/86	Indiana State U. Terre Haute, IN	Gave a seminar on the infrared properties of visible reflection nebulae
6/22-25/86	U. of Iowa Ames, Iowa	Presentation of infrared images of reflection nebulae at the 168th meeting of the American Astronomical Society
7/1-7/86	Jackson, WY	Attended the School on Inter-stellar Processes, and presented our analysis of the infrared properties of reflection nebulae

Publications and paper resulting from research as an Associate:

"Infrared Reflection Nebulae in the OPh, R CrA, and Chamealeon Dark Clouds", Castelaz and Hackwell, 1985, Bull. Amer. Ast. Soc., Vol. 16, p. 958

"IRAS Surface Brightness Maps of Reflection Nebulae in the Pleiades", Castelaz, Werner, and Sellgren, 1986, Bull. Amer. Ast. Soc., Vol 17, p. 958.

"Infrared Energy Distributions of Reflection Nebulae", Castelaz, Sellgren, and Werner, 1986, Bull. Amer. Ast. Soc., Vol. 18, p. 694.

"IRAS Infrared Energy Distributions of Reflection Nebulae: Evidence for Non-Equilibrium Infrared Emission", Castelaz, Sellgren, and Werner, 1986, Abstract in Summer School on Interstellar Processes, p. 91.

"IRAS Surface Brightness Maps of Reflection Nebulae in the Pleiades", Castelaz, Sellgren, and Werner, submitted to the Astrophysical Journal, June 1986.

"The Discovery of an Infrared Reflection Nebula Surrounding R CrA IRS5", Castelaz and Hackwell, submitted to the Astrophysical Journal, July 1986.

"Infrared Properties of Visible Reflection Nebulae", Castelaz, Werner, and Sellgren, in preparation.

Work in Progress:

Analysis and interpretation of IRAS images of 16 reflection nebulae is underway, and a paper describing these results is in preparation. This paper sums up the work we did on describing the infrared properties of visible reflection nebulae.

Observations to be made at the Wyoming Infrared Observatory of infrared reflection nebulae are being requested for a few days in January or February 1987. These observations will continue the work being done on understanding the properties of the nebular particles.

Future Position: Research Associate

Future Address: Allegheny Observatory
Observatory Station
Pittsburgh, Pennsylvania 15214

SUMMARY OF RESEARCH

Michael W. Castelaz, NRC Research Associate
NASA-Ames Research Center

July 18, 1986

The research I conducted concentrated in two areas of infrared astronomy: infrared polarimetry and analysis of images from the IRAS database. The infrared polarimetry from 1-5 μm involved the use of an electro-optically modulated CdTe polarimeter. Observations made from the NASA-IRTF with polarimeter allowed us to investigate the nebular characteristics of infrared reflection nebulae.

Analysis of IRAS images began upon acceptance of a proposal to the IRAS Guest Investigator Program to study visible reflection nebulae. Interpretation of the data shows that particles hundreds of times smaller than interstellar type grains are common in the interstellar medium.

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NATIONAL RESEARCH COUNCIL -- RESEARCH ASSOCIATESHIP PROGRAM

JUL 8 1986

TERMINATION REPORT

ASSOCIATESHIP

NAME: Katherine C. Ewel
PLACE: NASA/Ames Research Center
ADVISOR: Dr. James G. Lawless

DATE: 1 July 1986
TENURE: 20 January 1986 -
20 July 1986

POSITION: Professor, University of Florida

TRAVEL ON TENURE:

Meetings and Consultations:

10 February 1986 - 11 February 1986. Archbold Biological Station, Lake Placid FL. Workshop for contributors to Ecosystems of Florida

27 May 1986 - 30 May 1986. School of Forestry, University of Montana, Missoula MT. Consultation with Dr. Steven W. Running

Seminars:

6 February 1986. Department of Biological Sciences, Stanford University, Palo Alto CA. Simulation of Ecological Models

19 February 1986. Ecosystem Science and Technology Branch, Life Sciences Division, Ames Research Center, Moffett Field CA. Simulating Ecosystem Dynamics in a Southeastern Pine Plantation

PUBLICATIONS AND PAPERS:

Importance of Belowground Processes to Carbon, Phosphorus, and Water Cycles in a Southeastern Pine Forest. K. C. Ewel and H. L. Gholz. To be submitted to Forest Ecology and Management

Long-term Carbon, Phosphorus, and Hydrologic Dynamics in a Southeastern Pine Forest. K. C. Ewel. To be submitted to Forest Science.

FORWARDING ADDRESS:

Dr. Katherine C. Ewel
Department of Forestry
118 Newins-Ziegler Hall
University of Florida
Gainesville FL 32611

SUMMARY OF RESEARCH:

I have developed a model that simulates interactions among carbon, phosphorus, and water cycles in a southeastern pine plantation for 30 years (from planting to harvesting). I have extensively revised the basic model that simulates interactions in a mature (29-year-old) plantation, incorporating many of the changes that were necessary to complete successfully the longer simulation. Formulations regulating gross primary productivity, transpiration, and translocation must change when pine foliage reaches 20% of its average mature biomass (approx. 3 years) and 60% (approx. 10 years), suggesting that these are critical times in the physiological life of the stand.

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JUN 16 1986

ASSOCIATESHIP
OFFICE

TERMINATION REPORT

Name: Yu Fukunishi

Date: June 11, 1986

Place of tenure: NASA Ames Research Center
Fluid Dynamics Research Branch

Dates of tenure: From Sep.17,1984 to June 30,1986

Research Advisor: Dr. Sanford S. Davis

Professional post on leave: None

International post: None

Travel on tenure:

a. Meetings attended

Fifth symposium on Turbulent Shear Flows
Cornell University, Ithaca, NY
Aug.7-9,1985

Eleventh International Congress on Instrumentation
in Aerospace Simulation Facilities
Stanford University
Stanford,CA
Aug.26-28,1985

The 38th meeting of American Physical Society
Div. of Fluid Dynamics.
Tucson,AZ
Nov.24-26,1985

American Institute of Aeronautics and Astronautics
24th Aerospace Sciences Meeting
Reno,Nevada
Jan.6-9,1986

b. Seminars given at universities and institutes

NASA Ames Research Center
Moffett Field,CA
Nov.6,1984

University of Southern California
Los Angeles,CA
Oct.30,1985

California Institute of Technology
Pasadena,CA
Nov.1,1985

Stanford University
Stanford, CA
April 10, 1986

Illinois Institute of Technology
Chicago, IL
June 6, 1986

University of Houston
Houston, Texas
June 9, 1986

c. Meetings attended by specific invitation

Drag Reduction and Boundary Layer Control Symposium
National Academy of Sciences
Washington, D.C.
Oct. 22-25, 1985

Workshop on Flow Control
Stanford University
Stanford, CA
April 21-22, 1986

Teaching: None

Publications:

Study of Development of Coherent Structures
in Boundary Layers. (To be published.)

Application of Artificial Intelligence to
Wind Tunnel Research. (To be published.)

A New Language for Logical Programming in Experimental
Environments. (To be published.)

Patents: None

Work in progress:

Application of Artificial Intelligence to Wind
Tunnel Research (The Smart Probe Project), which
I initiated with two of my colleagues, is currently
under way. It is giving us initial promising results.

Future position and address:

Research Associate
c/o Prof. M. Hino
Department of Civil Engineering
Tokyo Institute of Technology
Ohokayama, Meguro-ku, Tokyo
Japan

Summary of research during Associateship:

First work was the flow behind the ogive cylinder. Using flow visualization technique, we investigated the cause of the asymmetry found in the flow behind this body and showed the way to control it. The result was presented in American Physical Society meeting. Next, detailed investigation was made to answer the question, "how the coherent structures in the boundary layers are made?". Our results explain the phenomena very well. I also initiated a research project to investigate the possibility of applying Artificial Intelligence in wind tunnel research.

61/2000
Bruce M. Halpryn, PhD 30 June 1986

NASA/Ames Research Center

Dr. Harold Sandler - Research Advisor

Tenure from 27 June 1983 to 29 June 1986

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JUN 9 1986

ASSOCIATESHIP
OFFICE

Travel while on tenure included attendance at American Physiological Society fall meetings in 1985 and 1983.

The following publications resulted from my tenure as an associate:

Sandler, Harold, V. Krotov, H. Stone, B. Kulaev, J. Hines, V. Krilov, B. Benjamin, V. Magedov, A. Nazin, B. Halpryn (1986). Cardiovascular Results from a Rhesus Monkey Flown aboard the Cosmos 1514 Spaceflight, and Ground-based Controls. In: Final Reports of U.S. Monkey and Rat Experiments Flown on the Soviet Satellite Cosmos 1514, (R. Mains, E. Gomersall Eds). NASA TM.

Sandler, Harold, V. Krotov, J. Hines, V. Magedov, B. Benjamin, A. Badakeva, B. Halpryn, H. Stone and V. Krilov (1986). Cardiovascular Results from a Rhesus Monkey Flown aboard the Cosmos 1514 Spacecraft. Submitted J. Aviat Space and Environ. Med.

Krotov, V., V. Magedov, H. Sandler, J. Hines, B. Benjamin, B. Halpryn, V. Krilov, N. Milonov (1985). Vosmoshnost registratsiy extravasculyarmim arterialmovo davlania ee kravatok oo obezyan v khronicheskom experimente (The possibility of measuring pressure and flow extravascularly during chronic experiments using monkeys). Submitted Bull. Exp. Biol. and Med. (in Russian).

Krotov, V., H. Sandler, A. Badakeva, J. Hines, A. Nazin, B. Halpryn (1985). Izucheniye terialnovo davleniye uu skorosti krovotok oo obezyaniy v kosmicheskom palyote (Changes in arterial pressure and blood flow in a monkey during spaceflight). Accepted by the All Union Conference on Aviation Medicine to be held June 1986, Kalyga, USSR.

Sandler, Harold, J. Hines, B. Halpryn (1985). Cosmos 1667 Cardiovascular Measurements - Experiment Management Plan. NASA Technical Document, 150 pgs.

Halpryn, Bruce M., E. Waterman, H. Sandler (1985). Effects of Various Restraint Chairs on Heart Responce in Rhesus Monkeys. The Physiologist 28(4):365

Halpryn, Bruce M. (1985). Biotelemetry Monitoring Systems. Laboratory Animal 14(6):21

Halpryn, Bruce M., Paul Houghton (1984). The Pole and Collar Training Technique for Restraining Rhesus Monkeys. NASA Technical Video.

Sandler, H., H. Lowell Stone, John W. Hines, Bruce Benjamin, Bruce Halpryn (1984). Final Science Report for Cosmos 1514 Primate Cardiovascular Experiment. NASA Technical Document, 188 pgs.

Sandler, H., H. Lowell Stone, John W. Hines, Bruce Benjamin, Bruce Halpryn (1984). Preliminary Science Report for Cosmos 1514 Primate Cardiovascular Experiment. NASA Technical Document, 97 pgs.

I am currently completing the analysis of data acquired comparing the effects of verticle (seated) vs horizontal hypokinesia on cardiovascular deconditioning in rhesus monkeys.

Summary of research during Associateship

As an associate at NASA/Ames I worked with the rhesus monkey as an animal of spaceflight induced cardiovascular deconditioning in man. To this end I developed a new restraint and training system that minimizes stress as a variable during these studies. I did long term studies with restrained and unrestrained (telemetry) studies to establish baseline levels for cardiovascular variables and their circadian variation as controls for spaceflight experiments. My work included analysis and interpretation of cardiovascular data resulting from Cosmos spaceflights 1514 and 1667. The effects of hypokinesia vs cephalad fluid shifts on cardiovascular deconditioning were also studied.

My next position is at:

Norwich-Eaton Pharmaceuticals Inc.
P. O. Box 191
Norwich, N. Y. 13815

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JUL 31 1986

TERMINATION REPORT
for the NRC Associateship Program

ASSOCIATESHIP OFFICE
Aug. 1, 1986

Name:

Katz Joseph

Place of Tenure:

NASA Ames Research Center, CA.

Research Adviser:

David G. Koenig

Dates of Tenure:

July 30 1984 - Aug. 30 1986.

Professional Travel during Tenure (to present papers):

1. Atmospheric Flight Dynamics Conf., Seattle, WA, Aug. 1984
2. SAE Int. Congress and Exposition, Detroit, MI, Feb. 1985
3. Atmospheric Flight Dynamics Conf., Colorado Springs, Aug. 1985
4. Aerospace Science Meeting, Reno, NEV, Jan. 1986
5. SAE Int. Congress and Exposition, Detroit, MI, Feb. 1986
6. Atmospheric Flight Dynamics Conf., Williamsburg, VA, Aug. 1986

Publications:

1. Katz J. and Schiff L. B. "Modeling Aerodynamic Response to Aircraft Maneuvers - A Numerical Validation", J. of Aircraft, Vol. 23, No. 1, pp. 19-25, 1986.
2. Schiff L. B. and Katz J., "Application of CFD Techniques Toward the Validation of Nonlinear Aerodynamic Models", presented in the AGARD Symposium on Unsteady Aerodynamics, May 1985, Gottingen, W. Germany.

3. Katz J. and Levin D., "Measurements of Canard Induced Roll Oscillations", AIAA Paper 85-1830-cp, presented at the Atmospheric Flight Dynamics Meeting, Colorado Springs, August 1985.

4. Katz J. "Evaluation of an Aerodynamic-Load Prediction Method on a STOL Fighter Configuration", AIAA Paper No. 86-0590, Jan. 1986.

5. Katz J. "Aerodynamic Model for Wing-Generated Down Force on Open-Wheel-Racing-Car Configurations" SAE Paper No. 86-0218, Feb. 1986.

6. Weihs, D. and Katz, J., "Transient Induced Drag", AIAA J., Vol. 24, No. 7, pp. 1203-1205, 1986.

7. Katz J. and Maskew B. "Unsteady Low-Speed Aerodynamic Model for Complete Aircraft Configurations" submitted to AIAA. AIAA Paper No. 86-2180, Aug. 1986.

Summary of Research During Associateship:

During my research program the flow-field about a V/STOL aircraft and other complex configurations was analysed by a subsonic panel method. Through the first stages of the research, several complex aircraft configurations were paneled, incorporating models for propulsion effects (jets and inlet flows). A validation of the method followed by comparing computed data with existing experimental data.

The above basic prediction method was later modified to compute the aerodynamic loads and vortex wake rollup during unsteady aircraft maneuvers. This method was also found to be adequate for simulating leading-edge flow-separation of slender wings at high angles of attack.

Forwarding Address:

Dr. Joseph Katz c/o V. R. Corsiglia
NASA Ames Research Center, 247-2
Moffett Field, CA 94035

CT/R/R/EC

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SEP 5 1986

**ASSOCIATESHIP
OFFICE**

Chief, Chemistry Division, Hamrahlid College,
Reykjavik Iceland

ABSTRACTS OF MEETING REPORTS (Local)

Hochstein, L.I., Altekari, W. and Kristjansson, H. (1985)
Is the ATPase from Halobacterium saccharovorum an
Evolutionary Relic? Second Symposium on Chemical Evolution
and the Origin and Evolution of Life. Ames Research Center,
USA.

Kristjansson, H. and Hochstein, L.I. (1986) Purification and Properties of a Novel ATPase in the Archaeobacterium, Halobacterium saccharovorum. Eighty Sixth Annual Meeting of the American Society for Microbiology, Washington D.C., USA.

Kristjansson, H. and Hochstein, L.I. (1986) A Unique ATPase in the Archaeobacterium, Halobacterium saccharovorum. Fifth Meeting of the International Society for the Study of the Origin of Life and the 8th International Conference on the Origin of Life, Berkeley, USA.

Kristjansson, H., Ponnamperna C. and Hochstein, L.I. (1984) ATPase Activity in Membranes of Halobacterium Saccharovorun. Federation of European Societies for

Microbiology Symposium: Evolution of Prokaryotes. Munich, Germany. (Attended by LI Hochstein)

Hochstein, L.I., Altekarr, W. and Kristjansson H. (1984) An ATPase Activity from the Archaeobacterium, Halobacterium saccharovororum. Federation of European Societies for Microbiology Symposium: Evolution of prokaryotes. Munich, Germany. (Attended by LI Hochstein)

SEMINAR

at the BHABHA Atomic Research Center, Bombay, India,, Dec, 1985.

INVITED PRESENTATIONS

Kristjansson, H., Ponnampereuma, C. and Hochstein, L.I. (1984) The Evolution of an Energy-transducing ATPase. International Chemical Congress of Pacific Basin Societies. Honolulu, USA (Attended by LI Hochstein)

Kristjansson, H. (1985) A Novel ATPase in the Archaeobacterium, Halobacterium saccharovororum. II International Symposium on Biomembranes: Structure, Biogenesis and Transport. Madurai, India.

Hochstein, LI., (1985) EMBO-FEMS workshop: Molecular Basis of Haloadaptation in Microorganisms. Obermarchtal, Germany. (LI Hochstein was invited and presented much of my unpublished work. This was later written up as a FEMS-Review paper authored by Kristjansson, Sadler and Hochstein, see below).

PUBLICATIONS

Kristjansson, H. and Hochstein, L.I. (1985) Dicyclohexylcarbodiimide sensitive ATPase in Halobacterium saccharovororum. Arch. Biochem. Biophys. 241 590.

Kristjansson, H. and Hochstein, L.I. (1986) Trypsin Digestion for Determining Orientation of ATPase in Halobacterium saccharovororum Membrane Vesicles. FEMS Lett 35, 171-175.

Kristjansson, H., Sadler, M. and Hochstein, L.I (1986) Halobacterial Adenosine Triphosphatases and the Adenosine Triphosphatase from Halobacterium saccharovororum. FEMS Microbiol. Rev. 39, 151-157

Kristjansson, H. and Hochstein, L.I. (1986) A Novel ATPase in the Archaeobacterium, Halobacterium saccharovororum. Proceedings of the II International Symposium on

Biomembranes: Structure, Biogenesis and Transport.
Madurai, India (in press).

Altekar, W., Kristjansson, H. and Hochstein, L.I. (1986)
On the Properties of the ATPase from Halobacterium
saccharovorum. Proceedings of the II International
Symposium on Biomembranes: Structure, Biogenesis and
Transport. Madurai, India (in press)

WORK IN PROGRESS

Kristjansson, H., Altekar W. and Hochstein, L.I. (1987)
Purification and Properties of a unique ATPase from
Halobacterium saccharovorum communicated to Biochim.
Biophys. Acta.

Kristjansson H. and Hochstein, L.I., (1987) A Unique ATPase
in the Archaeobacterium, Halobacterium saccharovorum.
Communicated to Orig. Life.

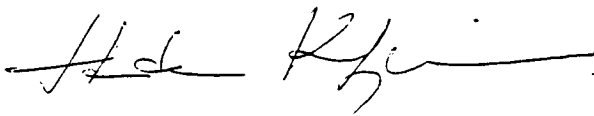
SUMMARY OF RESEARCH

The membrane-bound ATPase from the Archaeobacterium,
Halobacterium saccharovorum, was solubilized and purified.
The ATPase had a relative molar mass $M_r=320,000$ and
consisted of two major subunits of M_r 's = 87,000 and
60,000 and possibly two minor components of M_r 's = 29,000
and approximately 20,000. The enzyme was inhibited by
dicyclohexylcarbodiimide and 4-chloro-7-nitrobenzofurazan.
The inhibition and labeling patterns were however different
from such patterns of other ATPases. As judged from the
properties and subunit composition, the ATPase from H.
saccharovorum represented a novel enzyme which possibly
shared characteristics with newly isolated ATPases of the
secretory pathways in Eukaryotes. The consequences of these
findings may be of paramount importance for unravelling the
evolution of Archaeobacteria, Eubacteria, and Eukaryotes.

FORWARDING ADDRESS

Dr. Hordur Kristjansson
University of Iceland
Science Institute
Dunhaga 3
107 Reykjavik
Iceland

Sept 1, 1986



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ASSOCIATESHIP
OFFICE

Name: Rocco L. Mancinelli

July 18, 1986

Place of tenure: NASA-Ames Research Center

July 1984 to July 1986

Advisor: Lawrence I. Hochstein

Travel on Tenure:

American Society for Microbiology National Meeting, Las Vegas Nevada,
March 1985.

American Society for Microbiology National Meeting, Washington DC., March 1986.

Publications:

Mancinelli, R. L., and L. I. Hochstein. 1986. The occurrence of denitrification in extremely halophilic bacteria. *FEMS Microbiol. Letters*, 35:55-58.

Mancinelli, R. L., S. E. Cronin, and L. I. Hochstein. 1986. Purification and properties of the cd-cytochrome nitrite reductase from *Paracoccus halodenitrificans*. *Arch Microbiol.* In press.

Mancinelli, R. L., and L. I. Hochstein. The dissimilatory nitrite reductase from *Halobacterium denitrificans* In prep.

Forwarding Address:

Mail Stop 239-12

NASA-Ames Research Center

Moffett Field, CA 94035

Summary of Research:

When in the presence of nitrite anaerobically grown *Paracoccus halodenitrificans* possessed membrane-bound and cytoplasmic nitrite reductases. When assayed in the presence of phenazine methosulfate (PMS) and ascorbate, the membrane-bound enzyme produced nitrous oxide whereas the cytoplasmic enzyme produced nitric oxide from nitrite. When assayed in the presence of methyl viologen (MV) and dithionite no gases were produced from either fraction, a reaction was observed only with the cytoplasmic fraction which produced ammonia from nitrite. However, once solubilized the membrane-bound reductase behaved

identically to the cytoplasmic reductase, producing nitric oxide from PMS and ascorbate, and ammonia from MV and dithionite. The cytoplasmic and membrane-bound reductases were purified to essentially the same specific activity. The purified membrane-bound reductase and the purified cytoplasmic reductase were indistinguishable by non-denaturing polyacrylamide gel electrophoresis or by SDS-polyacrylamide gel electrophoresis. The spectral properties of the two enzymes were identical. These data suggest that the two reductases are identical, and that the product of nitrite reduction is determined by the location of the enzyme in the cell and the redox potential of the electron donor.

The ability of *Halobacterium vallismortis*, *H. mediterranei* and *H. marismortui* (Ginzburg strain) to grow anaerobically and denitrify was determined. Each organism grew anaerobically only in the presence of nitrate. *H. marismortui* produced nitrite and dinitrogen from nitrate during exponential growth. However, as the culture entered stationary phase dinitrogen production ceased and nitrous oxide was detected. *H. vallismortis* produced nitrous oxide and dinitrogen during exponential growth with dinitrogen production ceasing at the onset of stationary phase. *H. mediterranei* produced dinitrogen during exponential growth and did not produce nitrous oxide. These results confirm the occurrence of denitrification in the *Halobacteria*.

Halobacterium denitrificans possessed a membrane bound nitrite reductase. When grown anaerobically in the presence of nitrate. Membrane preparations produced nitric oxide from nitrite when NADPH, or ascorbate was used as the reductant, and phenazine methosulfate or methylene blue was used as the electron donor. When dithionite was used as the reductant nitrous oxide was the endproduct. The enzyme was inhibited by EDTA, diethyldithiocarbamate, biconchonic acid, α, α' -dipyridyl, 8-hydroxyquinoline, and under reducing conditions by potassium cyanide. It was not inhibited by azide. Ethanol enhanced enzyme activity. The absorption spectrum exhibited a maximum at 561 nm indicative of a copper reductase. The data suggested that the dissimilatory nitrite reductase from *H. denitrificans* is associated with copper.

Return to DUK

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TERMINATION REPORT

ASSOCIATESHIP
OFFICE
August 25, 1986

Elizabeth M. Wenzel

Place of Tenure

Aerospace Human Factors Research Division
Mail Stop 239-21
NASA-Ames Research Center
Moffett Field, CA 94035
(415) 694-5716

Research Advisor

Dr. David C. Nagel

Dates of Tenure

November 15, 1984 to August 27, 1986

Travel on Tenure

April 8 - 12, 1985: Meeting of the Acoustical Society of America, Austin, Texas. Presented a paper entitled "Lateralization of clicks based on interaural time: Additivity of information across frequency II."

November 4 - 8, 1985: Meeting of the Acoustical Society of America, Nashville, Tennessee. Also consulted with a colleague, Dr. Raymond H. Dye, in Chicago, IL on November 9 -10, 1985.

November 21 - 24, 1985: Meeting of the Psychonomic Society, Boston, MA.

Scientific Seminars and Meetings Attended

See listings under Travel on Tenure. Also, I audited a class in Fourier Analysis and periodically attended seminars in Cognitive Psychology at Stanford University.

Publications and Papers Resulting From Research as an Associate

Wenzel, E. M. Effects of stimulus characteristics and task demands on pilots' perception of dichotic messages. (Accepted for publication in the *Proceedings of the Human Factors Society*, September, 1986 meeting of the Human Factors Society, Dayton, Ohio.)

Work in Progress

In anticipation of my position as a researcher at Ames, I am planning several projects which explore the role of human spatial cognition in display design, particularly in applications involving proximity operations and telepresence for the Space Station. A unique aspect of the planned research involves the use of a helmet-mounted, virtual display derived from computer generation of a three-dimensional visual environment accompanied by the synthesis of three-dimensional auditory cues. For example, one study will examine the effects of degrading visual information on the phenomenon of visual capture, or the tendency for visual information to bias judgements of location when visual and auditory cues conflict. A related project involves developing an auditory symbology for use in information displays; that is, signals which effectively map different kinds of information into various auditory parameters so that they can be easily interpreted in conjunction with a visual display.

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Summary of Research During Associateship

As a member of the Human-Machine Interaction group, I have conducted applied research related to the design of interfaces in multi-modal information displays. For example, a recently completed study was related to the use of synthetic-voice technology in the helicopter cockpit. The experiment investigated the effects of increased task demands on pilots' perception of dichotic advisory messages when stimulus characteristics which normally facilitate performance in traditional dichotic-listening studies are present. In general, the combined effects of the stimulus and task variables were additive. When interactions did occur they suggested that an increase in task demands can sometimes mitigate, but usually does not remove, any processing advantages accrued from stimulus characteristics.

Future Position and Address

Research Psychologist, Principal Investigator
Aerospace Human Factors Research Division
NASA-Ames Research Center
Mail Stop 239-21
Moffett Field, CA 94035
(415) 694-5716

Termination Report

Name and Date: Jacob Zabara

Place of Tenure: - Ames Research Center

Research Adviser: Nancy G. Daunton, Ph.D.

Dates of Tenure: August 27, 1984 - August 27, 1986

Position and Title: Associate Professor of Physiology/Biophysics
Temple University
Philadelphia, PA

Travel on Tenure: Oxford, England
September 26, 1984 - September 29, 1984

Niagara Falls, NY
October 12, 1985 - October 20, 1985

Houston, Texas
February 9, 1986 - February 16, 1986

Scientific Meetings Attended: American Physiological Society-Commission on
Gravitational Physiology

International Man in Space Symposium

Foreign Meeting Attended by
Specific Invitation: Symposium on the Mechanisms and Treatment of
Nausea and Vomiting in Man -

Publications and Papers: Reciprocal Inhibition in Vomiting

Neuroinhibition of CTZ Emesis

Inhibitory Processes in Adaptation

Work in Progress: Neuroinhibition of Motion Sickness and CTZ
Emesis

The Role of GABA and Neuropeptide Release by
Vagal Stimulation in Motion and Space Sickness

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Research Summary

The purpose of this project was to investigate whether inhibitory neurons can prevent the emesis or nausea such as occurs in motion or space sickness. Inhibitory neurons in the cervical vagus of cats were stimulated with implanted cuff electrodes to prevent Xylazine induced vomiting. Repeated experimental stimulations eventually resulted in the complete absence of emesis by Xylazine. In addition, vagal stimulation prevented motion induced vomiting in preliminary procedures with two cats. Vagal inhibition of emesis might be mediated by gamma amino butyric acid (GABA), in association with neuropeptides, which was demonstrated to be released by cervical vagus stimulation.

Position and Address: Department of Physiology/Biophysics
School of Medicine
Temple University
3223 N. Broad Street
Philadelphia, PA 19140

JUL 20 1986

Termination Report - National Research Council Research Associateship
ProgramASSOCIATESHIP
OFFICE

Name: Saul J. Adelman

Date: July 31, 1986

Place of Tenure: Laboratory for Astronomy and Solar Physics
NASA Goddard Space Flight Center

Dates of Tenure: August 1, 1984 - July 31, 1986

Research Advisor: Dr. David S. Leckrone

On Leave From: The Citadel, Associate Professor of Physics

International Posts Held During Tenure:

Accepted Chairmanship of Scientific Organizing Committee,
IAU Working Group on Peculiar A Stars' Workshop on Elemental
Abundance Analyses to be held at Universite de Lausanne,
Switzerland, September 1987

Travel on Tenure:

meetings: 165th American Astronomical Society - Tucson, AZ,
January 1985

IAU Colloquium No. 90, "Upper Main Sequence Stars With
Anomalous Abundances", Crimean Astrophysical
Observatory, U. S. S. R., May 1985

166th American Astronomical Society - Charlottesville,
VA, June 1985

Seventh Annual I. A. P. P. P. Fairborn Symposium -
Apache Junction, AZ, February 1986

1986 IUE Conference - London, England, July, 1986

observing trips: Five to the Dominion Astrophysical Observatory,
Victoria, BC, Canada

One to Kitt Peak National Observatory, Tucson, AZ

seminars: Department of Physics and Astronomy, University of
Nevada, Las Vegas, March 1985

Publications (papers):

1. Spectrophotometry of Peculiar B and A Stars. XVII. 63 Andromeda, HD 34452, Epsilon Ursa Majoris, CQ Ursa Majoris, CU Virginis, CS Virginis, and Beta Coronae Borealis (1985, Astron. Astrophys. Suppl. 59, 369 with D. M. Pyper)

2. A Finding List for the Multiplet Tables of NSRDS-NBS3, Sections 1 - 10 (1985, Astron. Astrophys. Suppl. 60, 339 with C. J. Adelman, D. Fischel, and W. H. Warren, Jr.)

3. Ca II H and K Line Variability in the Ap Star HD 43819 (1985, Commission 27 IAU Information Bulletin on Variable Stars, No. 2701)

4. Spectrophotometry of Peculiar B and A Stars. XVIII. The Helium Variables HR 1890, Sigma Orionis E, and HD 37776 (1985, Astron. Astrophys. Suppl. 62, 279 with D. M. Pyper)

5. Optical Region Elemental Abundance Analyses of B and A Stars. IV. Reevaluation with New Critically Compiled Fe II gf-values and Improved Damping Constants (1985, Astron. Astrophys. 152, 434 with J. R. Fuhr)

6. The Peculiar A Star HD 43819: A Photographic Region Line Identification Study (1985, Publ. Astron. Soc. Pacific 97, 976)
7. On the Ultraviolet Energy Distributions and the Temperatures of Peculiar B and A Stars (1985, Publ. Astron. Soc. Pacific 97, 970)
8. The Field Horizontal-Branch Star HD 109995: New Results With Coadded Ultraviolet and Optical Region Spectra (1985, "Horizontal-Branch and UV-Bright Stars", ed. A. G. D. Philip, p. 75 with D. S. Leckrone)
9. An Investigation of Random and Fixed Pattern Noise in IUE High Dispersion Exposures (1985, NASA IUE Newsletter 28, 35 with D. S. Leckrone)
10. Optical Region Elemental Abundance Analyses of B and A Stars. V. The Normal Stars Theta Leonis, Tau Herculis, 14 Cygni, and 5 Aquarii (1986, Astron. Astrophys. Suppl. 64, 173)
11. Cool Magnetic CP Stars (1986, IAU Colloq. 90, "Upper Main Sequence Stars With Anomalous Abundances", ed. C. R. Cowley, M. M. Dworetsky, and C. Megessier, in press with C. R. Cowley)
12. The Metallic-Lined Star 32 Aquarii (1986, IAU Colloq. 90, "Upper Main Sequence Stars With Anomalous Abundances", ed. C. R. Cowley, M. M. Dworetsky, and C. Megessier, in press with D. Kocer and C. Bolcal)
13. Investigations of CP and Normal Stars with Coadded Dominion Astrophysical Observatory Spectrograms (1986, IAU Colloq. 90, "Upper Main Sequence Stars With Anomalous Abundances", ed. C. R. Cowley, M. M. Dworetsky, and C. Megessier, in press with G. Hill)
14. Spectrophotometry of the Broad, Continuum Absorption Features in Magnetic Ap Stars (1986, IAU Colloq. 90, "Upper Main Sequence Stars With Anomalous Abundances", ed. C. R. Cowley, M. M. Dworetsky, and C. Megessier, in press with D. M. Pyper)
15. The Ultraviolet IUE Spectrum of the Field Horizontal-Branch Star HD 109995 (1986, Astron. Astrophys., in press, with D. S. Leckrone)
16. An APT Consortium (1986, I. A. P. P. P. Communication No. 23, in press with R. J. Dukes, Jr.)
17. CP Stars with an APT (1986, I. A. P. P. P. Communication No. 23, in press with D. M. Pyper)
18. Using APTs to Study Standards, Derive Fundamental Stellar Parameters, and Study Be Stars (1986, I. A. P. P. P. Communication No. 23, in press with G. J. Peters)
19. Optical Region Elemental Abundances of B and A Stars. VI. The Normal Stars HR 6559 (A7 IV) and Eta Leporis (F0 IV) (1986, Astron. Astrophys. Suppl., in press)
20. CNO Abundances of Some Field Horizontal-Branch and Population I A Stars (1986, Publ. Astron. Soc. Pacific 98, in press with D. S. Hayes and A. G. D. Philip)
21. International Conference on Chemically Peculiar Stars of the Upper Main Sequence (1986, Comments in Astrophys., in press with D. M. Pyper)
22. The Ultraviolet Lines of Carbon, Nitrogen, and Oxygen in the Spectrum of the Field Horizontal-Branch A Star HD 109995 (1986, New Insights in Astrophysics: 8 Years of UV Astronomy with IUE, ESA SP-263, in press with D. S. Leckrone)
23. Elemental Abundance Analyses with Coadded DAO Spectrograms. I. The Field Horizontal-Branch Stars HD 64488, HD 109995, and HD 161817 (1986, submitted to Monthly Notices Roy. Astron. Soc., with G. Hill)
24. Elemental Abundance Analyses with Coadded DAO Spectrograms. II. The Mercury-Manganese Stars 53 Tauri, Mu Leporis, and Kappa Cancri (1986, submitted to Monthly Notices Roy. Astron. Soc.)

25. Optical Region Elemental Abundance Analyses of B and A Stars. VII. The Metallic Lined Star 32 Aquarii (1986, submitted to Astron. Astrophys., with D. Kocer, C. Bolcal, and E. Inelman)

26. The Abundances of Carbon, Nitrogen, and Oxygen in the IUE Spectrum of the Field Horizontal-Branch Star HD 109995 (1986, to be submitted to Astrophys. J. (Letters) with D. S. Leckrone)

Patents: None and none applied for

Work in Progress:

Optical Region Elemental Abundance Analyses of Normal B and A (especially α Peg, τ Her, and θ Leo) and HgMn stars (especially ι CrB, ν Cnc, HR 7664, 28 Her, and ϕ Her) using coadded DAO spectrograms

Determination of the He/H Ratio of the uv-bright star Barnard 29 (with D. S. Hayes and A. G. D. Philip)

An Atlas of the Field Horizontal-Branch Stars HD 64488, HD 109995, and HD 161817 in the Photographic Region (with W. A. Fisher and G. Hill)

An Atlas of the IUE Spectrum of HD 109995 (with D. S. Leckrone and S. Johansson)

Noise in IUE Spectra (with D. S. Leckrone)

The Analyses of the IUE Spectra of Nine B and A Stars (with D. S. Leckrone)

Preparation for the Workshop on Elemental Abundance Analyses (see above)

Organization of a meeting on "Spectrophotometry with Automated Telescopes", approx. Feb. 1988, Phoenix, AZ area (with D. S. Hayes)

Forwarding Address:

Department of Physics
The Citadel
Charleston, SC 29409

Office Telephone: 803-792-6943

Summary of Research During Associateship:

To support the study of the ultraviolet spectra of B and A stars, I performed photographic region elemental abundance analyses. My advisor Dr. D. S. Leckrone and I completed our study of noise in high dispersion IUE spectra, a crucial step in synthesizing the complex ultraviolet spectra. We are now concentrating on the metal-poor star HD 109995 as its spectrum is easiest to model. Its abundances suggest it formed in part from the debris of a massive metal-poor supernova early in the history of Our Galaxy.

TERMINATION REPORT
NATIONAL RESEARCH COUNCIL RESEARCH ASSOCIATESHIP PROGRAM

Charles D. Dermer

July 7, 1986

Place of Tenure: Laboratory for High Energy Astrophysics, Goddard Space Flight Center, Greenbelt, MD 20771

Dates of Tenure: July 25, 1984- July 24, 1986

Research Adviser: Dr. Reuven Ramaty

Travel on Tenure:

Domestic Travel

Tucson, AZ, January, 1985, 165th Meeting of the American Astronomical Society. Presented "Directionality of Relativistic Bremsstrahlung from Solar Flares"

Crystal City, VA, April, 1985, Spring 1985 Meeting of the American Physical Society, presented "Particle Kinematics of Relativistic Plasmas"

Charlottesville, VA, June, 1985, 166th Meeting of the American Astronomical Society, presented "Pion Production in Proton-Proton and Proton-Helium Reactions"

La Jolla, CA, August, 1985, 19th International Cosmic Ray Conference, presented "Antiproton Production in Relativistic Plasmas" (by invitation)

Taos, New Mexico, July, 1986, Workshop on Gamma-Ray Stars, will present "Directionality of Gamma-Ray Emission from Solar Flares" (by invitation)

Foreign Travel

Les Arcs, France, March, 1986, Vth Moriond Astrophysics Meeting, presented "Neutron and Antineutron Production in Accretion on Compact Objects" (by invitation)

Additional Invited Talks

"Physics of Nonmagnetic, Relativistic Thermal Plasmas," September 18, 1984, NASA/ Goddard Space Flight Center

"High-Energy Processes in Solar and Cosmic-Ray Physics," January 21, 1986, NASA/ Goddard Space Flight Center

Publications during Tenure:

"Physics of Nonmagnetic Relativistic Thermal Plasmas," C. D. Dermer, Ph. D. Thesis, 1984, University of California, San Diego (NASA TM 86154).

"Binary Collision Rates of Relativistic Thermal Plasmas. I. Theoretical Framework," Charles D. Dermer, 1985, Astrophysical Journal, 295, 28.

- "Secondary Production of Antiprotons in Relativistic Plasmas," C. D. Dermer and R. Ramaty, XIXth International Cosmic Ray Conference Proceedings, 1985, 2, 338.
- "Directionality of Bremsstrahlung from Relativistic Electrons in Solar Flares," Charles D. Dermer and Reuven Ramaty, 1986, Astrophysical Journal, 301, 962.
- "Binary Collision Rates of Relativistic Thermal Plasmas. II. Spectra," Charles D. Dermer, 1986, Astrophysical Journal, in press.
- "Secondary Production of Neutral Pi-mesons and the Diffuse Galactic Gamma Radiation," C. D. Dermer, 1986, Astronomy and Astrophysics, 157, 223.
- "Secondary Production of Antiprotons in Relativistic Plasmas," C. D. Dermer and R. Ramaty, 1986, Nature, 319, 205.
- "Neutron and Antineutron Production in Accretion onto Compact Objects," C. D. Dermer and R. Ramaty, Proceedings of the VIth Moriond Astrophysics Meeting, 1986, in press.
- "High Energy Processes in Solar Flares," R. J. Murphy, C. D. Dermer, and R. Ramaty, 1987, Astrophysical Journal, Supplement Series, submitted.

Work in Progress:

- "Binary Collision Rates of Relativistic Thermal Plasmas. III. Theory of the Relativistic Two-Temperature Plasma."
- "Secondary Pion Production and Particle Anisotropy in Solar γ -Ray Flares," with J. A. Miller and R. Ramaty.
- "Limits on Anisotropy of Solar-Flare Electrons from Electron-Induced Pair Production"

Future Position: Research Associate, University of Maryland, College Park, MD

Mailing Address (remains unchanged): NASA/ GSFC, Code 665, Greenbelt, MD 20771

Research Summary:

During the past two years as a National Academy Postdoctoral Research Associate, I have studied relativistic plasmas and high-energy processes on the Sun. The former is a continuation of my thesis research, and has yielded the first complete calculation of electron-positron thermal bremsstrahlung throughout the transrelativistic regime of temperature, and the first calculations of secondary electron and positron spectra in relativistic nucleonic plasmas. These results are presently being applied to the theory of relativistic two-temperature plasmas. In association with Dr. Reuven Ramaty, I investigated the possibility that the reported low-energy antiproton component of the cosmic radiation results from proton-proton collisions in relativistic thermal plasmas. We have extended this work to relativistic nonthermal plasmas, and have calculated the associated production of neutrons in the collisions of protons and the spallation of light nuclei.

I am also collaborating with Dr. Ramaty in the analysis and interpretation of γ -ray flare data provided by the Solar Maximum Mission. We have completed a study proposing that the preferential distribution of γ -ray flares near the solar limb reflects the beaming of bremsstrahlung radiation from anisotropic distributions of energetic electrons. In association with

Dr. R. J. Murphy, we evolved a consistent explanation for the particle and γ -ray observations in terms of two separate particle populations in the June 3, 1982 solar flare. We are also considering, in association with J. A. Miller, the consequences of pion production from and anisotropy of energetic solar flare ions.

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NRC RESEARCH ASSOCIATESHIP TERMINATION REPORT MAY 2 1986

Name: Michele Kaufman

Date: April 29, 1986
ASSOCIATESHIP
OFFICE

Place of Tenure: NASA - GSFC

Dates of tenure: 1/21/1986 - 5/20/1986

Research Adviser: T. P. Stecher

On leave from the following position: lecturer

International posts held during tenure: none

Travel on tenure: none , but shall be giving the following colloquia at GSFC:
(1) a CSC Lunchtime Colloquium on May 20, 1986 and (2) a Goddard Space Flight
Center Colloquium (General) on May 23, 1986.

Teaching as an Associate: none

Publications and papers resulting from research as an Associate: Have written
a preprint "Giant H II Regions in M81" in collaboration with Bash, Kennicutt,
and Hodge for submission to the Astrophysical Journal.

Patents applied for: none

Work in progress: I am preparing a paper "Star Formation and Spiral Structure
in M81" for presentation at the conference "Star Formation in Galaxies", June
16 - 19, 1986. This involves comparing the spiral arms defined by various
spiral tracers in M81 with one another and with the predictions of density
wave models for M81.

Future position and address: lecturer, Department of Physics, Ohio State
University, 174 West 18th Ave., Columbus, OH 43210.

Summary of research during Associateship:

From H α and VLA radio observations of the galaxy M81, we find that (i) the
radial distribution of extinction in the plane of M81 shows more scatter than
trend; (ii) the set of giant radio H II regions is strongly concentrated to
the spiral arms and shows a sharp maximum at a galactocentric distance $R \approx$
300"; (iii) our data disagree with the Visser-Shu model for star formation by
a spiral density wave unless the, as yet undetected, molecular hydrogen is
concentrated near $R = 300''$. The giant radio H II regions and the nonthermal
radio emission lie downstream from the spiral velocity shock.

Termination Report (NRC Research Associateship Program)

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JUN 10 1986

ASSOCIATESHIP
OFFICE

• NAME: Takeo Kosugi • Date: June 6, 1986

• PLACE OF TENURE: NASA-Goddard Space Flight Center
(Laboratory for Astronomy and Solar Physics)

RECEIVED

• DATES OF TENURE: April 1, 1985 - June 30, 1986

JUN 10 1986

• RESEARCH ADVISER: Dr. Brian R. Dennis

ASSOCIATESHIP
OFFICE

• PERMANENT POST: Research Associate - Tokyo Astronomical Observatory
of University of Tokyo, Japan

• TRAVEL ON TENURE:

- (1) NASA-Marshall Space Flight Center, Huntsville, AL, May 5-10, 1985.
- (2) National Solar Observatory, Sunspot, NM, August 18-27, 1985.
- (3) University of Texas at Austin, Austin, TX, September 15-18, 1985.
- (4) University of Texas at Austin, Austin, TX, February 23-27, 1986.
- (5) California Institute of Technology, Pasadena, CA, May 28 - June 1, 1986.

• SCIENTIFIC SEMINARS AND MEETINGS ATTENDED:

- (1) Workshop on Solar High-Resolution Astrophysics Using the Pinhole/Occulter Facility (at NASA-MSFC, Huntsville, AL, on May 8-10, 1985).
- (2) NSO (National Solar Observatory)/SMM 1985 Summer Meeting on the Lower Atmosphere in Solar Flares (at Sacramento Peak, Sunspot, NM, on August 20-24, 1985).
- (3) SMM Topical Workshop on Rapid Fluctuations in Solar Flares (at Ramada Inn, Lanham, MD, on September 30 - October 4, 1985).
- (4) Workshop on Fourier Imaging Techniques in X-ray Astronomy (at California Institute of Technology, Pasadena, CA, on May 28-30, 1986).

• TEACHING: None

• PUBLICATIONS AND PAPERS:

- (1) "Flux Relationship between Hard X-rays and Microwaves from Solar Flares", T. Kosugi, in Proc. NSO (National Solar Obs.)/SMM (Solar Maximum Mission) 1985 Summer Meeting on the Lower Atmosphere in Solar Flares, in press, 1986.
- (2) "Energy of Microwave-Emitting Electrons and Hard X-ray/Microwave Source Model in Solar Flares", N. Nitta and T. Kosugi, Solar Phys., in press, 1986.
- (3) "Quasi-Periodic Pulsations in Solar Hard X-ray and Microwave Flares", T. Kosugi and A.L. Kiplinger, in Proc. SMM Topical Workshop on Rapid Fluctuations in Solar Flares, in press, 1986.
- (4) "Signatures of Current Loop Coalescence in Solar Flares", J. Sakai, T. Tajima, H. Nakajima, T. Kosugi, F. Brunel, and E. Zaidman, in Proc. SMM Topical Workshop on Rapid Fluctuations in Solar Flares, in press, 1986.

- (5) "Energetic Electrons in Impulsive and Extended Solar Flares as Deduced from Flux Correlation between Hard X-rays and Microwaves", T. Kosugi, B.R. Dennis, and K. Kai, to be submitted to Ap.J. in June, 1986.
- (6) "Current Loop Coalescence Model of Solar Flares", T. Tajima, J. Sakai, H. Nakajima, T. Kosugi, F. Brunel, E. Zaidman, L. Vlahos, and M.R. Kundu, to be submitted to Ap.J. in June, 1986.

● PATENTS APPLIED: None

● WORK IN PROGRESS:

- (1) Study on the vertical structure of hard X-ray and microwave solar flares by using flares which occurred behind the limb.
- (2) Study on general characteristics of flares showing quasi-periodic pulsations in their time profiles.

● FUTURE POSITION: Same as permanent post.

(Postal address) Nobeyama Solar Radio Observatory of TAO
Nobeyama, Minamimaki, Minamisaku,
Nagano 384-13, JAPAN

● SUMMARY OF RESEARCH DURING ASSOCIATESHIP:

I have compared hard X-ray and microwave observations of more than 400 solar flares. Although the two emissions correlate well, the dependence of the correlation on hard X-ray photon energy was found to be significantly different between flares of an impulsive type and flares of an extended type. Existing flare models were reviewed upon this finding. Also I have examined quasi-periodicity of solar flares and found that this periodicity cannot be explained by a random process. Flares which occurred behind the limb have been examined for determining the vertical structure of X-ray and microwave sources.

National Research Council
Resident Research Associates Termination Report

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SEP 2 1986

ASSOCIATESHIP
OFFICE

Name: William J. Massman
Date: August 29, 1986
Place of Tenure: NASA/Goddard Space Flight Center
Tenure Dates: April 1, 1985 through August 29, 1986
Advisers: E. Kalnay and Y. Sud
Travel and Seminar: Attended American Meteorological Society Conference on Agricultural and Forest Meteorology, Phoenix, Arizona, May 21, 1985 through May 23, 1985.

Presented a seminar (by invitation) to the Hydrological Sciences Branch at NASA/Goddard Space Flight Center. January 9, 1986.

Presented a seminar (by invitation) to the Rocky Mountain Forest and Range Experiment Station, Fort Collins Colorado. August 12, 1986.

Publications: A Comparative Study of Some Simple Mathematical Models of the Mean Structure With and the Aerodynamic Drag of Plant Canopies, (submitted to Boundary Layer Meteorology).

Mass and Heat Transfer To and From Vegetated Surfaces: An Analytical Approach, (submitted to Boundary Layer Meteorology).

Work in Progress: Assisting in the design and testing of a surface (soil-plant-atmosphere) energy balance model to be used for remotely estimating evaporation. This model is currently being developed by the Hydrological Sciences Branch here at NASA/Goddard Space Flight Center.

Future Position: Research Meteorologist
Address: Rocky Mountain Forest and Range Experiment Station, 240 West Prospect Street, Fort Collins, Colorado 80526.

Summary of Research: My research has largely been devoted to parameterizing the exchange coefficients which govern momentum, heat and vapor transfer between vegetated surfaces and the atmosphere. The results are reported in the two papers listed above. I have also done some exploratory work on radiative transfer in plant canopies coupled to my work on the exchange coefficients so as to relate the evaporative and sensible heat fluxes of a plant canopy to remotely sensed surface temperatures.

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TERMINATION REPORT

NAME: Srinivasan Vathsal DATE: June 14, 1986
PLACE OF TENURE: Greenbelt, MD DATES of TENURE: June 15, 1984-
June 15, 1986
RESEARCH ADVISERS: Eugene Lefferts Landis Markley
(June 15, 1984 to (June 15, 1985 to
June 15, 1985) June 15, 1986)

Travel on Tenure

- (i) San Diego, California - November 25-30, 1984 - IEEE 1984 Position Location and Navigation Symposium
- (ii) Reno, Nevada - January 5-10, 1986 - AIAA 24th Aerospace Sciences Meeting
- (iii) Howard University, Washington DC - March 14, 1986 - Lecture given on topic: "Application of Optimal Nonlinear Filtering and Control Concepts in Satellite Attitude Determination"
- (iv) San Diego, California - June 9-12, 1986 - Technology Space Systems Conference

Publications and Conference Papers

1. "Digital Simulation of Strapdown Navigation Algorithms Using Quaternions" International Conference on Computers, Systems, and Signal Processing, Bangalore, India, December 10-12, 1984.
2. "Optimal Control of Quaternion Propagation Errors in Spacecraft Navigation" Journal of Guidance and Control, May/June 1986.
3. "Design and Simulation of Closed Loop Ground Alignment of Inertial Platforms with Sway Motion" Journal of Guidance and Control, May/June 1986.
4. "Nonlinear Filtering for Spacecraft Attitude Estimation" Paper Presented in the AIAA 24th Aerospace Sciences Meeting, January 6-9, 1986.
5. "Spacecraft Attitude Determination Using a Second Order Nonlinear Filter" Paper submitted to Journal of Guidance and Control.

Work in Progress

Spacecraft dynamic simulators are built to validate the models used in the simulation by comparing the actual system performance with the simulated performance. If the simulator does not perform as expected, then it is necessary to analyze the control system response using dynamic equations and transfer functions and suggest modifications for simulator software and models. In this light, mathematical models are being developed for:

- (I) Rigid body motion of spacecraft attitude.
- (II) Sensor models.
- (III) Momentum wheel and reaction thruster dynamics.
- (IV) Control laws.
- (V) Environmental torques.
- (VI) Pulse width modulation for reaction control systems.
- (VII) Control loop integration, sampling and digitization effects.

Literature survey is completed and analysis is continuing.

Summary of Research

For satellite attitude estimation using quaternion parameterization and sequential filters, the following new algorithms have been developed and tested using computer simulation techniques:

- (i) Online normalization of quaternion vector using optimal control concepts. Initial normalization errors are driven to zero by this technique.
- (ii) Second order nonlinear filtering algorithm to estimate the quaternion vector and gyro drift rates, accounting directly the nonlinear effects due to model replacement of angular velocity vector using gyro data and nonlinearities in the star tracker measurement model. The uniqueness of this algorithm is the online generation of the time-varying process and measurement noise covariance matrices, derived as a function of the process and measurement nonlinearity, respectively.

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NATIONAL RESEARCH COUNCIL
RESEARCH ASSOCIATESHIP PROGRAM
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AUG 15 1986

ASSOCIATESHIP
OFFICE

Dr. Coerte V. Voorhies
Geophysics Branch
Code 622/NASA
Goddard Space Flight Center
Greenbelt, MD 20771

Date: August 12, 1986
Tenure: 8/29/84 - 8/17/86
Advisor: Dr. Robert A. Langel

Travel During Tenure

- a. Scientific Meetings and Conferences (Domestic):
 - Geopotential Research Meeting Science Conference;
University of Maryland, College Park, MD; 10/29-31/86.
 - American Geophysical Union, Fall 1984 Meeting;
San Francisco, CA; 12/3-7/84.
 - American Geophysical Union, Spring 1985 Meeting;
Baltimore, MD; 5/27-31/85.
 - American Geophysical Union, Fall 1985 Meeting;
San Francisco, CA; 12/9-13/85.
 - American Geophysical Union, Spring 1985 Meeting;
Baltimore, MD; 5/19-22/86.
- Scientific Meetings and Conferences (Foreign):
 - International Association of Geomagnetism and Aeronomy,
Fifth General Assembly; Prague, CZ; 8/5-15/85.
- b. Seminars and Lectures (all by invitation):
 - Geophysics Branch, Goddard Space Flight Center, Greenbelt, MD; 2/21/85.
 - Oregon State University, Corvallis, OR; 6/19-21/85.
 - Jet Propulsion Laboratory, Pasadena, CA; 2/18-19/86.
 - The Colorado College, Colorado Springs, CO; 3/19-21/86.
 - Heidelberg College, Tiffin OH; 5/23/86.
- c. Meetings Attended by Invitation:
 - Topographic Core-Mantle Coupling conference; invited seminar;
Jet Propulsion Laboratory, Pasadena, CA; 2/18-19/86.
 - American Geophysical Union; Spring, 1986 Meeting; invited presentation;
Baltimore, MD; 5/19-22/86.
 - Topographic Core-Mantle Coupling conference; invited participant;
Jet Propulsion Laboratory, Pasadena, CA; 7/15-16/86.

Publications During Tenure

- a. Refereed Technical Papers:
 - Voorhies, C. V., and G. E. Backus, Steady Flows at the Top of the Core from Geomagnetic Field Models: The Steady Motions Theorem, Geophys. Astrophys. Fluid Dynamics, 32, pp. 163-173, 1985.
 - Voorhies, C. V., Steady Flows at the Top of Earth's Core Derived from Geomagnetic Field Models, to appear in J. Geophys. Res., 1986.

b. Published Abstracts:

- Voorhies, C. V., Magnetic estimates of the fluid velocity at the top of earth's core, Trans. Am. Geophys. Un., 65, p 870, 1984.
 Voorhies, C. V., On understanding secular variation, Trans. Am. Geophys. Un., 66, p 253, 1985.
 Voorhies, C. V., On the validity of the dual source-free mantle - frozen-flux core approximation, Trans. Am. Geophys. Un., 67, p 263, 1986.
 Voorhies, C. V., Steady, pseudo-geostrophic flows at the top of earth's core, Trans. Am. Geophys. Un., 67, 263, 1986.

c. Unpublished Abstracts and Summaries:

- Voorhies, C., Some anticipated contributions to core fluid dynamics from the GRM, in Geopotential Research Mission Science Conference Abstracts, 1984.
 Benton, E. R., and C. V. Voorhies, Assesment of IGRF candidate geomagnetic field models from the viewpoint of magnetic flux conservation, International Association of Geomagnetism and Aeronomy, Fifth General Assembly Programme and Abstracts, Vol. 1, p 156, 1985.
 Voorhies, C. V., and E. R. Benton, Steady velocity fields at the core-mantle boundary from geomagnetic field models, International Association of Geomagnetism and Aeronomy, Fifth General Assembly Programme and Abstracts, Vol. 1, p 157, 1985.
 Voorhies, C. V., Geomagnetic modeling of the fluid motions at the top of earth's core, in the 1985 Geophysics Branch Annual Report, C. Schnetzler, ed..

Work in Progress (Tenative Titles)

- a. Review Article: Secular Variation of the Main Geomagnetic Field, the Geomagnetic Jerk of 1969, and Frozen-Flux Modeling of Core Motions; for the Geomagnetism and Paleomagnetism section of the 1987 U.S. National Report to the International Union of Geodesy and Geophysics. (Should appear in Reviews of Geophysics, 1987).
- b. Article: Steady, Surficial Core Motions from Geomagnetic Field Models: an Alternate Method; targeting submission to Geophysical Research Letters this year.
- c. Article, with coauthor E. R. Benton: Assesment of the IGRF Candidate Models from the Viewpoint of Magnetic Flux Conservation; for submission to either Geophysical Research Letters or a special issue of Physics of the Earth and Planetary Interiors.
- d. Article: Steady, Pseudo-Geostrophic Flows at the top of Earth's Core. (Calculations completed, but little progress on writing this one).
- e. Work in progress for six short articles: (1) Magnetic location of earth's core mantle boundary; (2) Local estimates of upwelling at the top of earth's core; (3) The secular variation spectrum and the conductivity of the mantle; (4) On the validity of the dual source-free mantle - frozen-flux core approximation; (5) Radial vorticity and induction at the top of the core; (6) Steady flows for geomagnetic field forecasting.

- f. Computations of geostrophically constrained core motions for use in Topographic Core-Mantle Coupling calculations; article planned with coauthors B. Hager, R. Clayton, J. Dickey, R. Hide, and M. Speith.
- g. Organizing session on Secular Variation on Time-Scales up to 100 Years for the 1987 meeting of the International Association of Geomagnetism and Aeronomy in Vancouver, B. C..

Future Position and Address:

Geophysicist, GS-12/1
 Geophysics Branch
 Code 622/NASA
 Goddard Space Flight Center
 Greenbelt, MD 20771

Summary of Research During Associateship

During my tenure, I have continued geophysical research into the general problem of estimating the surficial motions of earth's electrically conducting liquid outer core from geomagnetic main field and secular variation data (and models thereof). This has lead to: (1) an improved method for computing core velocity fields; (2) the full development of a non-trivial, yet qualitatively simple and quantitatively accurate, explanation of the large scale secular variation for intervals of a few decades which yields fairly good preliminary forecasts; (3) a study of the effect of the dynamical geostrophic constraint on steady core flows; and (4) a better understanding of the effects of crustal fields, mantle conductivity, and viscous and magnetic diffusion in the core. I have actively contributed to the science of geomagnetism (including the adoption of the Definitve Geomagnetic Reference Field models), made many contacts in both the domestic and international geomagnetic communities, and started interacting with researchers in other geophysical disciplines so as to address the topographic core-mantle coupling and decade fluctuations in the length of the day.

TERMINATION REPORT

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JUN 27 1986

ASSOCIATESHIP
OFFICE

Name and date: Dayton L. Jones, 23 June 1986

Place of tenure: Jet Propulsion Laboratory, Pasadena, CA.

Research Advisor: Dr. Robert A. Preston

Dates of tenure: 1 August 1984 - 27 June 1986 (originally
scheduled to end on 29 July 1986)

International posts: Elected to the International Astronomical
Union (commission 40) and the International
Radio Science Union (commission J).

Travel on tenure: Two observing trips -- one to the Owens Valley
Radio Observatory near Big Pine, CA (Oct 1984)
and one to the Goldstone Deep Space Network site
near Barstow, CA (April 1985).
One trip to the NRAO Very Large Array site near
Socorro, N.M. (April 1985) for data analysis.
Two trips to scientific meetings (listed below).

Meetings attended: American Astronomical Society meetings in
Tucson (Jan 1985) and Houston (Jan 1986).

Seminars and lectures: Invited colloquia at UCLA, U. of Colorado,
and U. of New Mexico.

Meetings attended by specific invitation: None.

Teaching: None.

Publications from research as an Associate:

"Does Orientation Affect the Smoothness of Parsec-Scale
Radio Jets?", D. L. Jones, Astron. J. 90, 1446 (1985).

"High Dynamic Range V LBI Observations of NGC 6251", D. L.
Jones, S. C. Unwin, A. C. S. Readhead, W. L. W. Sargent,
G. A. Seielstad, R. S. Simon, R. C. Walker, J. M. Benson,
R. A. Perley, A. H. Bridle, I. I. K. Pauliny-Toth, J.
Romney, A. Witzel, P. N. Wilkinson, L. B. Baath, R. S.
Booth, D. N. Fort, J. A. Galt, R. L. Mutel, and R. P.
Linfield, Astrophys. J. 305, 684 (1986).

"High Dynamic Range Maps of 18-cm VLBI Calibration Sources",
R. S. Simon, D. L. Jones, and the "cast of thousands" on
the previously listed paper, in preparation (1986).

"Evidence for Intrinsically Asymmetric Radio Structure in
the Nucleus of NGC 6251", D. L. Jones, Astrophys. J., in
press (1986).

Patents applied for: None.

Work in progress: Studies of very compact radio sources, using high

frequency (22 GHz) VLBI observations to obtain the highest possible angular resolution. Also studies of improvements in global fringe fitting algorithms for radio interferometry.

Summary of research during Associateship:

Although the angular resolution of radio maps produced by very-long-baseline interferometry (VLBI) experiments is very high, and quality of these maps (their dynamic range) has generally been quite low. I have shown that it is possible to make VLBI maps with dynamic ranges much greater than 100 to 1 by combining large arrays of telescopes with global fringe fitting and careful attention to calibration. The improved quality of these maps allowed new tests of relativistic beaming models of compact radio sources, and these tests show that the relatively simple "twin-beam" models cannot explain all compact sources.

Future position and address: Member of the Technical Staff, JPL.

Dr. Dayton L. Jones
Mail Code 138-307
Jet Propulsion Laboratory
4800 Oak Grove Drive
Pasadena, CA. 91109

Termination Report

National Research Council Research Associateship Program

Name: Margaret J. Lyell

Date: August 4, 1986

Place of tenure: NASA - Jet Propulsion Laboratory ASSOCIATESHIP
OFFICE

Date of tenure: May 7, 1984 - August 6, 1986

Research advisor: Dr. Taylor G. Wang

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Travel on Tenure:

- 1.) American Physical Society / Fluid Dynamics Division
38th Annual Meeting, Tucson, Arizona, Nov. 24-26, 1985.
presented "Normal modes of a viscous compound drop".
- 2.) International Symposium on Variational Methods for
Free Surfaces, Menlo Park, CA, Sept 9-13, 1985.
- 3.) American Physical Society / Fluid Dynamics Division
37th Annual Meeting, Brown University, Providence, Rhode Island,
Nov. 18-20, 1984. Presented "Rotation of a Liquid Compound
Drop System".

Publications:

- 1.) M.J. Lyell & T.G. Wang, " Oscillations of a viscous compound drop", accepted for publication in Phys. Fluids.
- 2.) C.P. Lee, H.J. Lyell, & T.G. Wang, " Viscous damping of the oscillations of a rotating simple drop", Phys. Fluids, 28, 1985, p. 3187.
- 3.) M.J. Lyell & T.G. Wang, " Oscillations of a compound drop system undergoing rotation ", Phys. Fluids, 28, 1985, p 1023.
- 4.) H.J. Lyell & P. Huerre, " Linear and non-linear stability of plane stagnation flow ", J. Fluid Mech., 161, 1985

Work in progress:

An analytical / theoretical investigation of the coupling of an external acoustic field to a liquid drop. In the technique of acoustic levitation, the drop is held in position due to radiation pressure forces. Temporal modulation of the acoustic field induces drop oscillations. The resulting flow field is to be determined using the method of successive approximation.

Future position : Assistant professor

Future address : West Virginia University
Dept. of Mechanical & Aerospace Engineering
P.O. BOX 6101
Morgantown, West Virginia 26506-6101

Summary of research :

My work has focussed primarily on the dynamics of free drops and bubbles. In particular, I have studied the compound drop system, which is composed of a fluid core of density $\rho^{(i)}$ surrounded by a shell of density $\rho^{(s)}$ embedded in a host medium of density $\rho^{(o)}$. The fluid may be liquid or gas. The effect of rotation upon the normal modes of a compound drop was considered. The analysis was linear and inviscid. Constituent fluids were assumed incompressible. Both symmetric and non-axisymmetric disturbances were considered. Although results are dependent upon what parameter values (such as density and surface tension) are chosen; various general limit cases were obtained analytically.

The damping of oscillations due to the action of viscosity was also investigated (for a non-rotating compound drop). It was found that the compound drop is much more heavily damped than a comparably sized simple drop (of the same material). Again, specific results are dependent upon the values of parameters chosen.

the combined effects of rotation and viscosity upon free drop dynamics was studied in the context of the rotating viscous simple drop.

Work in progress at the end of tenure has focussed on the driven drop (driven by acoustic forces).

NATIONAL RESEARCH COUNCIL
RESEARCH ASSOCIATESHIP PROGRAM

AUG 25 1986

Termination Report

- Name: David A. Paige
- Date: 08/20/86
- Place of tenure: Jet Propulsion Laboratory,
California Institute of Technology
- Dates of tenure:
08/08/85 - 08/07/86
- Research adviser: Daniel J. McCleese
- Travel on tenure:
 - a. Scientific seminars and meetings attended:
 - MECA workshop, "Evolution of the Martian Climate," Aug. 9-10, 1985, Honolulu, Hawaii
 - MECA workshop, "Dust on Mars," Feb. 24-26, 1985, Tempe, Arizona
 - MECA symposium, "Mars: Evolution of Its Climate and Atmosphere," July 17-19, 1986, Washington, DC
 - b. Seminars and lectures at universities and institutes:
 - lecture, California State University at Long Beach, Sep. 23, 1985
 - c. Meeting attended by specific invitation:
 - Symposium on "Planetary Ice," American Geophysical Union meeting, Dec. 12, 1985, San Francisco, California
- Publications resulting from research as an associate:

"Remote Sensing of the Atmosphere on Mars Using Infrared Pressure Modulation and Filter Radiometry," D.J. McCleese, J.T. Schofield, R.W. Zurek, J.V. Martonchik, R.O. Haskins, D.A. Paige, R.A. West, D.J. Diner, J.R. Locke, M.P. Chrisp, W. Willis, C.B. Leovy, F.W. Taylor. Accepted for publication in Applied Optics.
- Work in progress:
 - a. Continued study of Viking Observations of the Martian Polar Regions
 - b. Continued planning of Mars Observer Mission which will launch in 1990.
- Future position and address: Assistant Professor of Planetary Science
Dept. Earth and Space Sciences
UCLA
Los Angeles, CA 90024

- Summary of research during associateship:

The principal goal of my research program over the past year was to assess the feasibility and to devise a method for obtaining a new set of Martian polar radiative balance measurements with the Mars Observer spacecraft. This goal has been largely accomplished. It was found that the spatial, temporal and angular coverage that can be obtained at the poles by the Mars Observer spacecraft can be used to determine polar radiation budgets that are significantly more accurate and complete than are presently available. These measurements will greatly enhance our understanding of the behavior of Martian volatiles over seasonal and climatic timescales.

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NRC-Associateship Office
AUG 18 1986

RESEARCH ASSOCIATESHIP PROGRAM - TERMINATION REPORT

NAME: GEOFFREY CHRISTOPHER TOON

PLACE OF TENURE: JET PROPULSION LABORATORY

DATES OF TENURE: 10TH JUNE 1984 TO 9TH JULY 1986

RESEARCH ADVISOR: DR. C.B. FARMER

TRAVEL ON TENURE: Seminar given at California Institute of Technology
23rd January 1986. "High resolution ground-based
FTIR spectroscopy for atmospheric composition
measurements".

Programmatic meetings attended by specific invitation:
ATMOS Science Team meeting (JPL, Oct. '84)
ATMOS Science Team meeting (Abingdon, U.K., Dec. '85)
ATMOS Science Team meeting (Hilton Head, SC, March '86).

PUBLICATIONS: "Detection of stratospheric N₂O₅ by infrared remote sounding"
Nature 319, 570 (1986).

IN PROGRESS: "A High Resolution FTIR spectrometer for atmospheric meas-
urements"
"An Algorithm for the retrieval of atmospheric composition
from high resolution spectra"
"Measurements of odd nitrogen compounds in the middle atmos-
phere by the ATMOS experiment on Spacelab 3".

FUTURE POSITION: Member Technical Staff, Jet Propulsion Laboratory, Mail Stop
183-401, 4800 Oak Grove Drive, Pasadena, CA 91109.

RESEARCH SUMMARY: I have participated in the assembly, alignment and operation
of the new JPL Fourier Transform spectrometer, which has
yielded high quality IR spectra of the atmosphere from the
ground. Unfortunately, owing to recurring balloon failures,
the scheduled balloon flights of the instrument were post-
poned. In order to develop data analysis procedures I
therefore used spectra measured by ATMOS, a very similar
instrument which flew on Spacelab 3 in April 1985. In the
course of this work I made a detection of N₂O₅ from the
ATMOS data. I have also studied feasibility of making
thermal emission measurements with the interferometer.

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NRC RESEARCH ASSOCIATESHIP PROGRAM - TERMINATION REPORT

MAY 10

ASSOCIATE
OFFICE

Name: Thomas Miles Date: May 13, 1986

Dates/Place of Tenure: June 4, 1984 - June 3, 1986; NASA Langley Research Center

Research Adviser: Dr. William L. Grose

Travel on Tenure:

A. Foreign Meetings Attended:

Graz, Austria; June 27-July 5, 1984
Edinburgh, U.K.; August 1-2, 1985 (consultations)
Prague, Czechoslovakia; August 5-10, 1985

U.S.A. Meetings Attended:

Boulder, Colorado; April 22-26, 1985
Greenbelt, Maryland/Washington, D.C.; September 27-28, 1984 (consultations)

B. Invited Participant for SCOSTEP/MAP Workshop on Southern Hemisphere
Stratospheric Dynamics held in Williamsburg, Virginia; April 21-24, 1986

Publications/Research Papers:

Miles, T., 1984: Intercomparison of radiosonde and satellite 30mb time-mean planetary-scale diagnostics. COSPAR Topical Meeting on Intercomparison of Stratospheric/Mesospheric Data. Graz, Austria. (Oral Presentation)

Miles, T. and W.L. Grose, 1985: Wave activity in the summer stratosphere observed by LIMS. IAGA/IAMAP Symposium on Dynamics and Remote Sensing of the Middle Atmosphere. Prague, Czechoslovakia. (Oral Presentation by T.M.)

Miles, T. and W.L. Grose, 1986: Transient medium-scale wave activity in the summer stratosphere. Bull. Amer. Meteor. Soc., 67, (scheduled for June issue)

Miles, T. and W.L. Grose, 1986: Isentropic analysis of Southern Hemisphere medium-scale eddies based on Nimbus-7 LIMS temperature and trace constituent data. Second International Conference on Southern Hemisphere Meteorology, Wellington, New Zealand (December 1-5). (Accepted for Oral Presentation)

Miles, T., W.L. Grose, E.E. Remsberg, and J.M. Russell III, 1986: Southern Hemisphere comparison of LIMS and radiosonde temperatures at 100mb. (Manuscript to be submitted)

Rinsland, C.P., J.S. Levine, and T. Miles, 1985: Tropospheric methane concentration deduced from 1951 infrared solar spectra. Nature, 318, 245-249.

Work in Progress: Evaluation of the accuracy of Southern Hemisphere base-level height analyses and LIMS-radiosonde temperature comparisons

Future Position/Address: Research Meteorologist
HQM 251, Control Data,
P.O. Box 1249,
Minneapolis, Minnesota 55440.

Summary of Associateship Research:

Nimbus-7 LIMS temperature retrievals and base-level geopotential height data have been used to derive isentropic potential vorticity (IPV) maps for the Southern Hemisphere extratropical lower stratosphere. The daily evolution of IPV maps during January 1979 is dominated by medium-scale IPV wave activity, which is found to be strongly correlated with the LIMS ozone and nitric acid measurements when climatological zonal-mean 5mb base-level heights are used in the IPV derivation. The quality of LIMS IPV maps, however, is found to deteriorate if conventional base height information (e.g. the NMC 50mb analysis) is prescribed for the IPV analysis.

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TERMINATION REPORT

JUL 21 1986

July 1986

**ASSOCIATESHIP
OFFICE**

TO: National Research Council

FROM: Melvin H. Snyder

This report covers my activities as a Resident Research Associate at NASA Langley Research Center for the period of 1 August 1985 to 31 July 1986.

For the tenure of this associateship I was assigned to the Viscous Drag Reduction group of the Subsonic Aerodynamics Branch, Low-Speed Aerodynamics Division. This group has now become the nucleus of the new Flight Applications Branch, LSAD, under direction of Dr. Bruce Holmes. L. J. Williams was assigned as my mentor, and Bruce Holmes has served as my technical supervisor.

I am on leave of absence from Wichita State University, Wichita, Kansas, where I am Professor of Aeronautical Engineering.

Travel

During my tenure, I participated in the following travel:

- (A) March 3-7, 1986: Attended AIAA 14th Aerodynamic Testing Conference, W. Palm Beach, Florida.
- (B) March 19-23, 1986: Traveled to Wichita State University to prepare and edit a proposal for WSU to participate with Langley Research Center in the new U.S.R.A./NASA Aeronautics Advanced Design Program.
- (C) April 2-4, 1986: Attended AIAA 3rd Flight Testing Conference and Technical Display, Las Vegas, Nevada.
- (D) April 16-19, 1986: Presented a paper at the 13th Southeast Conference on Theoretical and Applied Mechanics at University of South Carolina, Columbia, S.C. (copy of the paper is attached.)

(Expenses of my participation in conferences (A) and (C) were reimbursed by NRC)

Other Professional Activities

I participated in the following conferences, meetings, etc. at the Langley Research Center:

August 5-8, 1985: Meeting on Aircraft Drag Prediction and Reduction

October 8-10, 1985: Vortex Flow Conference

November 19-21, 23, 1985: AIAA General Aviation Course

March 24-26, 1986: Conference on Instabilities and Transition to Turbulence.

Work in Progress

Work in progress includes fabrication of a new remotely-controlled laminar flow smoke wand for the 4 by 7 meter wind tunnel. The wand, which I designed, will be tested in the tunnel and then used for flow visualization in a test of a variable-sweep reflection-plane wing. I will negotiate with NASA to return to Langley Research Center to participate in these tests.

Summary of Research

The general research objective is study of the effects of wing sweep-back on stability of the natural laminar boundary layer. Specifically, it was desired to determine a fluid (and injection technique) which, when injected into the boundary layer, will reveal the presence of vortices produced by crossflow in the boundary layer of a swept wing. The action of the vortices may then be observed to determine interaction with Tollmein - Schlichting waves and their contribution to boundary layer transition.

Experimental and analytical investigations of condensing vapor, of porous airfoil surfaces, and of various methods of generating fogs and smokes were conducted. It was decided that a laminar stream of fog (condensed glycol vapors) could be introduced into the boundary layer at the attachment line on a swept wing. A system was designed to accomplish this in the 4 x 7 meter tunnel, and it will be fabricated and used experimentally.

A complete summary report has been submitted to Dr. Bruce Holmes.



Volume II

SECTAM XIII

PROCEEDINGS

**1986
SOUTHEASTERN CONFERENCE
ON THEORETICAL AND APPLIED MECHANICS**

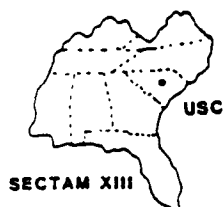
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Carolina Inn
Columbia, South Carolina**



**Hosted by
College of Engineering
University of South Carolina**

**Edited by
William F. Ranson
Joseph M. Biedenbach**

Characteristics of Airfoils at Angles of Attack Beyond the Stall



Melvin H. Snyder
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Wichita, Kansas

Abstract

Design and operation of wind turbines and prediction of dynamics of aircraft maneuvering at angles above the stall require knowledge of aerodynamic characteristics of airfoils for angles of attack and Reynolds numbers not previously available. Operating characteristics of both horizontal-axis and vertical-axis wind turbines include angles of attack from 0 to 90 degrees and Reynolds numbers from 100,000 to 8 million. This paper includes aerodynamic characteristics of a number of airfoils tested through more than 90 degrees angle of attack. The importance of the leading edge suction coefficient as a predictor of turbine performance and as the prime variable for turbine control is discussed. It is shown that in the range of angles of attack from 20 degrees to 50 degrees the airfoil characteristics, vary rapidly, are important to turbine performance, and their variation is unknown for most airfoils. Discussions of Reynolds number effects and of turbine control are also included.

Nomenclature

a	Streamwise slowdown factor
a'	Induced rotational velocity factor
c_d	Coefficient of drag
c_l	Coefficient of lift
c_s	Coefficient of leading-edge suction
c_n	Coefficient of normal force
D	Drag force
L	Lift force
N	Normal force
n	Rotational speed
r	Local radius
R	Turbine radius
Re	Reynolds number
S	Leading-edge suction force
t/c	Airfoil thickness ratio
V_a	Wind speed
x	Tip speed ratio, $2\pi Rn/V_a$
α	Airfoil angle of attack
β	Blade section pitch angle
δ_a	Aileron deflection angle (positive down)
ϕ	Relative wind angle at a blade section, $\phi = \alpha + \beta$

Introduction

In recent years needs have arisen for the aerodynamic characteristics of airfoils for angles of attack and Reynolds numbers not previously available. Areas of application include design and operation of wind turbines and dynamics of aircraft maneuvering at angles beyond the stall.

Operating characteristics of wind turbines are such that the airfoil sections of the blades operate beyond the ranges for which data on most airfoil section has been previously collected and published. It is possible, using blade twist, to design a horizontal-axis wind turbine (HAWT) which will operate, at design conditions, at angles of attack below the stall where the aerodynamic characteristics are well known. However, during most of the operating time the turbines operate off-design.

More significantly, blades of mid-sized and large turbines are designed so that the maximum dimension of the blade section are in the direction of the greatest stress and stress reversal. The maximum recurring load is bending due to the weight of the blade and the resulting blade stress changes direction twice every revolution. To minimize the fatigue effects of this type of loading, a large blade is designed with zero pitch angle, and the pitch of the basic blade cannot be controlled.

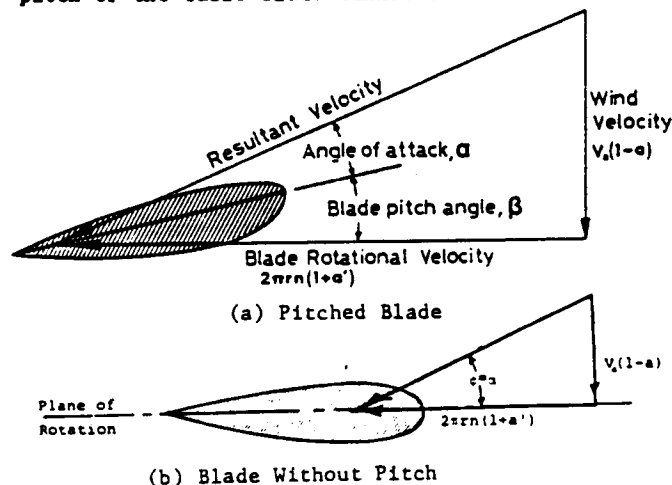
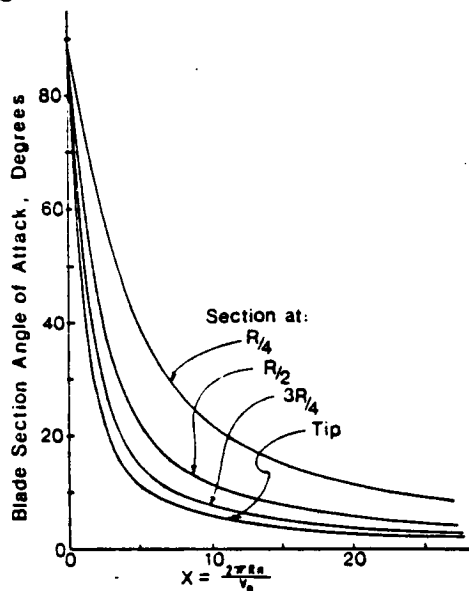


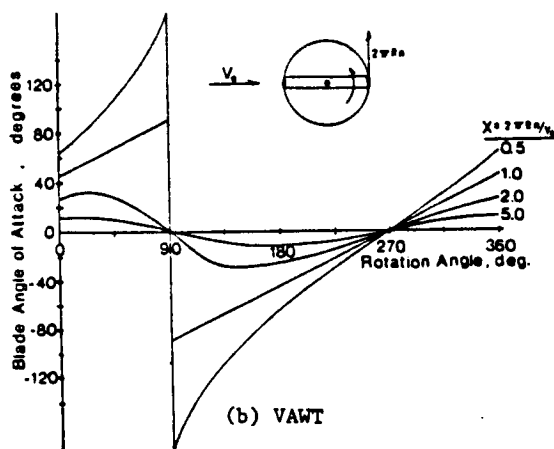
Fig. 1. Velocities at a Blade Section.

Figure 1a shows the general relation between the components of velocity at a blade section

element. If the blade is untwisted and has zero pitch, as in figure 1b, the relative wind angle is the section angle of attack, α . The magnitude of this angle of attack is shown in figure 2a.



(a) HAWT



(b) VAWT

Fig. 2. Blade Angles of Attack.

Darrieus-type vertical-axis turbine blades also operate without pitching the blades. Figure 2b shows the variation of blade angle attack for sections of VAWT blades.

For both HAWT and VAWT the force which provides the torque is the chordwise force, i.e., the leading-edge suction component of the aerodynamic force. In figure 3, this force component is S . The normal force, N , acts in the direction to bend the blades and to blow the tower away. Coefficients of the suction and normal forces are related to the coefficients of lift and drag through the transformation relations:

$$c_s = c_l \sin \alpha - c_d \cos \alpha$$

$$c_n = c_l \cos \alpha + c_d \sin \alpha$$

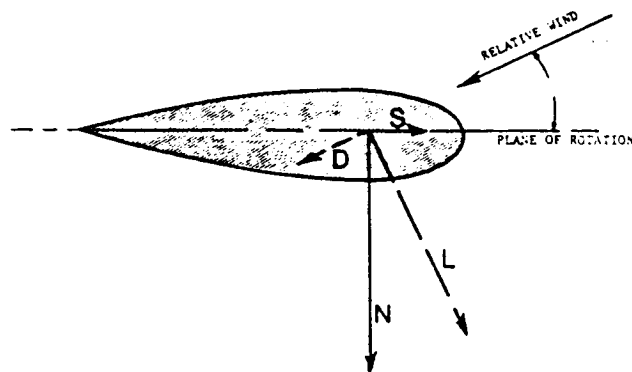


Fig. 3. Forces Acting on a Wind Turbine Blade Element.

The value of c_s is quite important. Increased c_s will produce greater torque (and power). To stop a turbine, it is necessary to produce negative c_s .

The wide variety of turbine sizes and the change of speed across the radius of the blade result in blade section Reynolds numbers, during operation, ranging from 100,000 to 8 million.

Because of these large operating ranges of angles of attack and of Reynolds numbers, consideration of some airfoil series has been neglected during the rotor design due to lack of airfoil data for sections with the required thickness.

One of the earliest publications of high range of angle of attack characteristics was in NACA TN 3361, in 1954. These data, for the NACA 0012 airfoil at $Re = 1.8 \times 10^6$, are reproduced in figure 4. Some design codes have been based on these data for any airfoil operating at angles of attack above the stall. Other high-range data taken in this period are not usable, because of classification for weapons application or because of the high turbulence of the 2-D tunnel test facility.

At Wichita State new 2-D walls were developed which produced low turbulence and were easy to install. With the use of a 5-tube probe wake survey system, reasonably reliable drag of the unstalled airfoil was obtained as well as dynamic tares of the end plates. This system has been used to obtain wide-range angle of attack data on a number of airfoil sections as reported in references 2, 3 and 4. Additional data have been obtained by correcting high aspect ratio reflection plane data to infinite aspect ratio.

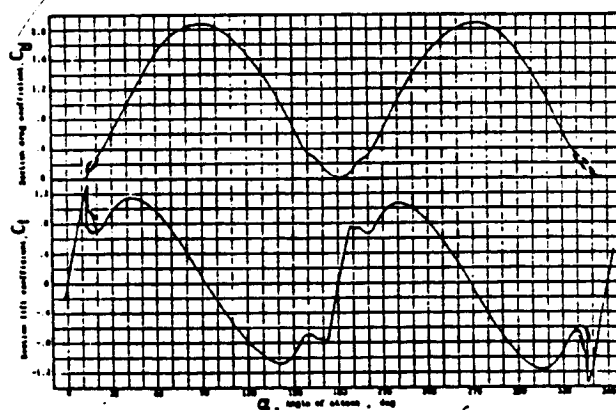


Fig. 4. NACA 0012, $Re = 1.8 \times 10^6$.

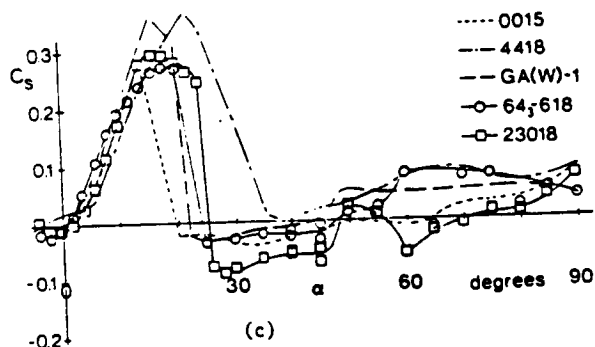
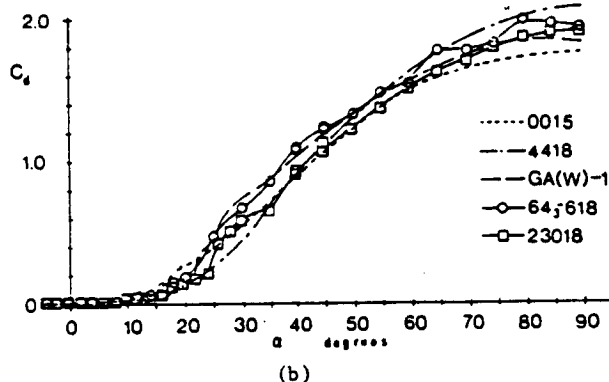
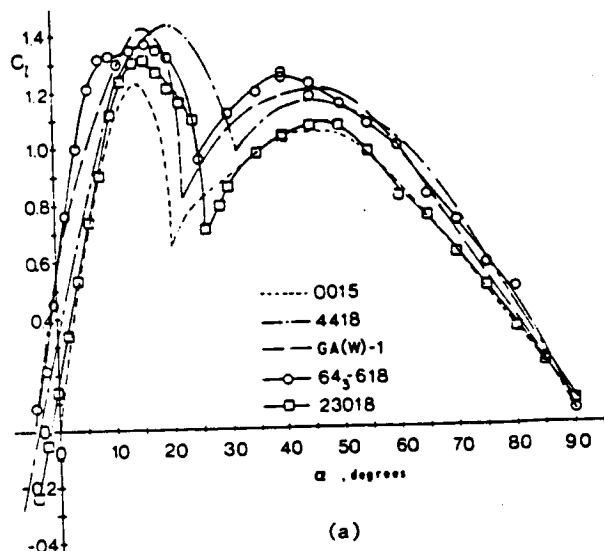


Fig.5. Aerodynamic Characteristics of 5 Airfoils.

Airfoil Characteristics

In figure 5, characteristics of airfoils having thicknesses from 15% to 18% are compared for angles of attack up to ninety degrees. Attention is directed to the wide variation of the coefficients at angles above the stall. Characteristics of these airfoils (and other airfoils) for angles of attack from zero to just above stall are readily found in many publications. Generally unknown for most airfoils are the characteristics at angles above the stall angle. As can be seen, these

characteristics vary widely from one family of airfoils to another. At angles of attack from about 20 degrees to 50 degrees, the coefficients (1) vary rapidly, (2) are quite important to turbine performance, and (3) are largely unknown.

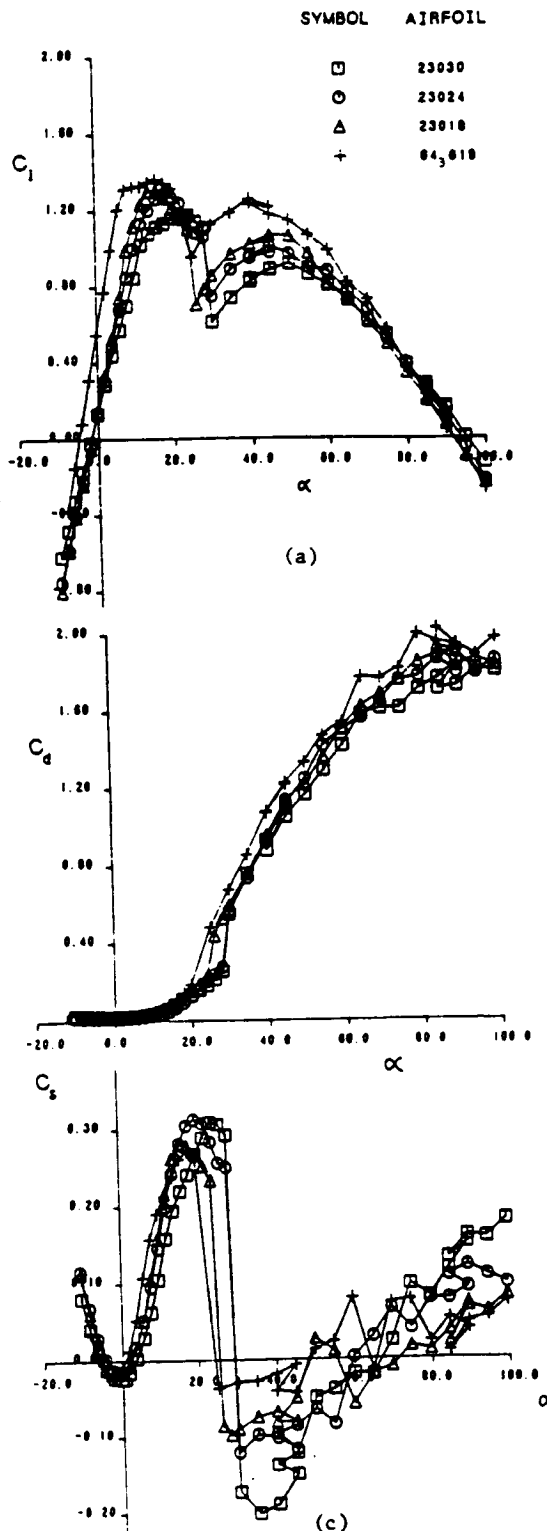


Fig.6. Effects of Thickness.

Desirability of an airfoil for a wind turbine section can be judged from the graph of c_p vs. angle of attack. In figure 5, the largest values of c_p over the greatest range of angles of attack appears to be the NACA 4418 section (of this group of airfoils). Figure 6 compares the characteristics of four airfoils which have been used in constructing some of the large wind turbines: NACA 23030, 23024, 23018, and 643618. The 643618 airfoil appears, in figure 6a, to produce more lift over most of the range of angles of attack, but figure 6c shows that the thickest airfoil, 23030, is clearly better for it produces higher c_p over a wider range of angles of attack. c_p remains positive to $\alpha = 30^\circ$. This result has important implication for selection of airfoil sections near the hub region of the turbine. The very thick sections are quite desirable for, in addition to the aerodynamics superiority, the thicker blade will be stronger and more resistant to fatigue.

Turbine Control

The good performance of thick NACA sections discussed above has a disadvantage. The most important and difficult problem is the problem of control of the turbine. Control includes extracting the maximum amount of energy from light winds, preventing turbine overspeed and overdriving the generator in stronger winds, and stopping the turbine in the event of high winds and/or loss of generator load. Some large HAWT's have provision to pitch the outboard 20% to 30% of blades in order to accomplish this control. However, for the same

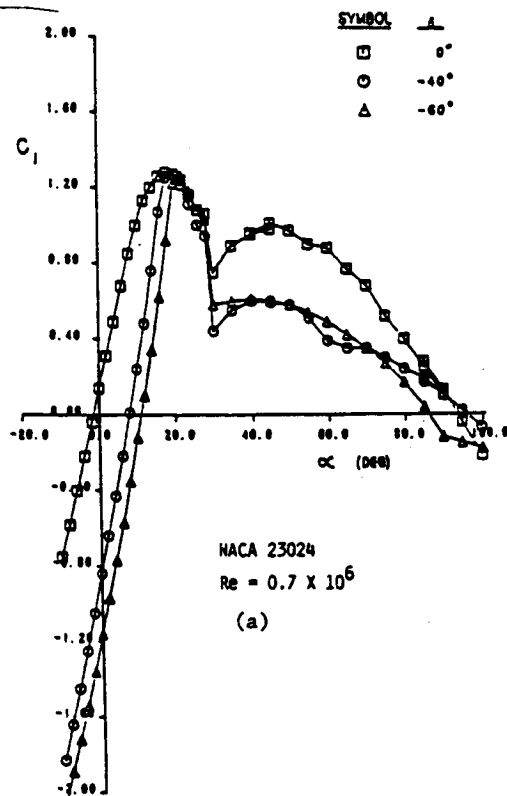


Fig.7. Characteristics of Airfoil with 20% Chord Ailerons.

reasons for designing a solid hub, it is desirable to have a continuous spar of the blade extend from one tip to the other.

An attempt was made to control the Mod-0 turbine using ailerons on the outer 30% of the blades. The effects of downwind deflection of these ailerons are shown in figure 7. The range of angles of attack producing positive leading-edge suction force is narrowed considerably. These

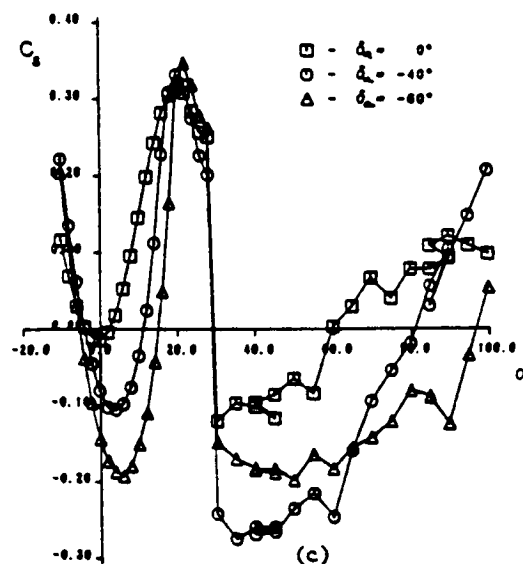
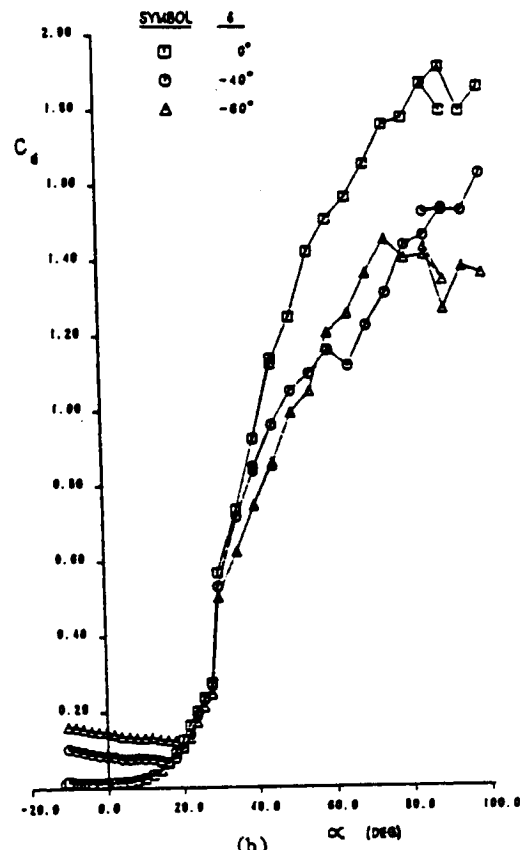


Fig.7. Characteristics of NACA Airfoil with 20% Chord Aileron, $Re = 0.7 \times 10^6$.

ailerons successfully slowed the Mod-0 turbine to a speed where it could be safely stopped by a mechanical shaft brake.

To be completely successful an aerodynamic device should be capable of producing negative c_s over the entire range of angles of attack from zero to ninety degrees. A larger deflector-lip aileron with a vented hinge line has been developed which does produce negative c_s from less than 0° to greater than 90° . The details of this aileron have been reported in an FEDD report, which will be available in the open literature in 1987.

Reynolds Number Effects

Unfortunately, the W.S.U. airfoil tests have been limited to Reynolds numbers from 0.6×10^6 to slightly more than 10^6 . However, over this small range, the Reynolds number effect is significant. Figure 8 shows that increasing Re from $.6 \times 10^6$ to 1×10^6 extends the upper limit of positive c_s from 28° to 40° . A similar effect is found with deflected aileron. The data of figure 8 is for aspect ratio of 13.3.

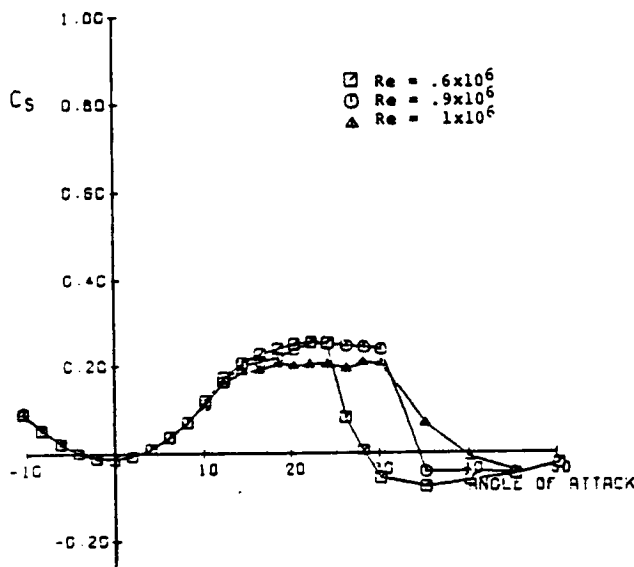


Fig.8. Reynolds Number Effects.

Conclusions

For HAWT's with untwisted zero pitch blades and for VAWT's, c_s is the primary aerodynamic characteristic to be considered in design and prediction of performance.

A large portion of the blades of HAWT's and VAWT's operate at angles of attack above the stall most of the time.

For design usage, data in the range of 20 to 50 degrees angle of attack is needed for more airfoils.

Thick airfoils with well-rounded leading edges are desirable in that they produce positive c_s over a wide range of angles of attack.

Operational Reynolds numbers of wind turbines range from 10^5 to 8×10^6 . More test data on effects of Reynolds number on airfoil characteristics, particularly on c_s , are needed.

A major problem of wind turbine design and operation is control. Advanced design ailerons offer promise of positive control.

References

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2. Satran, Dale, and Snyder, M.H.: Two-Dimensional Tests of GA(W)-1 and GA(W)-2 Airfoils at Angles of Attack from 0 to 360 Degrees; WER-1, Wind Energy Laboratory, Wichita State University, Wichita, KS, January, 1977.
3. Sheldahl, Robert E., and Klimas, Paul C.: Aerodynamic Characteristics of Seven Symmetrical Airfoil Sections Through 180-Degree Angle of Attack for Use in Aerodynamic Analysis of Vertical Axis Wind Turbines; SAND 80-2114, Sandia National Laboratories Energy Report, Albuquerque, NM, March, 1981.
4. Snyder, M.H., Wentz, W.H., and Ahmed, A.: Two-Dimensional Tests of Four Airfoils at Angles of Attack from 0 to 360 Degrees; WER-16, Center for Energy Studies, Wichita State University, Wichita, KS, February, 1984.
5. Ostowari, C., and Naik, D.: Post-Stall Wind Tunnel Data for NACA 44XX Series Airfoil Sections; SERI/STR-2559, Solar Energy Research Institute, Golden, CO, January, 1985.

Termination Report

July 31, 1986

Dr. John O. Wilson

Place of tenure: Langley Research Center, NASA, Hampton, VA 23665

Dates of tenure: November 19, 1984 - August 29, 1986

Research Adviser: Dr. Robert C. Harriss

International posts: None

Travel on tenure:

Scientific seminars and meetings

1. 1984 Fall AGU/ASLO Meeting, San Francisco, CA, Dec. 3-7, 1984
2. 1985 ASLO Meeting, Minneapolis, MN, June 17-21, 1985
3. 1986 Winter AGU/ASLO Meeting, New Orleans, LA, Jan. 12-17, 1986
4. 1986 AGU Spring Meeting, Baltimore, MD, May 19-22, 1986
5. IV International Congress of Ecology, Syracuse, NY, Aug. 9-16, 1986

Seminars given

1. Methane flux from tropical Amazonian wetlands - Biology Department, Boston University, Boston, MA, Jan. 27, 1986
2. Atmospheric methane sources: tropical and subtropical freshwater wetlands - Ecosystems Center, Marine Biological Laboratory, Woods Hole, MA, Jan. 28, 1986
3. Seasonal variation of methane emissions from a temperate, freshwater swamp - Langley Research Center, NASA, Hampton, VA, July 21, 1986

Travel for research

1. Morehead City, Cape Lookout Bight, NC - methane flux study, collaboration with Dr. Chris Martens, June 9-13, 1985
2. Amazon, Manaus, Brazil - methane flux measurements from Amazon River floodplain near Manaus, Brazil, August 7- September 8, 1985

Teaching during tenure: none

Publications and presentations during NRC tenure:

- Valiela, I., J. Wilson, R. Buchsbaum, C. Rietsma, D. Bryant, K. Foreman and J. Teal, 1984, Importance of chemical composition of salt marsh litter on decay rates and feeding by detritivores, *Bull. Mar. Sci.* 35:261-269.
- Wilson, J., 1985, Decomposition of [¹⁴C]lignocelluloses of *Spartina alterniflora* and a comparison with field experiments, *Appl. Environ. Microbiol.* 49:478-484.

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Publications, cont'd

- Wilson, J.O., I. Valiela and T. Swain, 1986, Sources and concentrations of vascular plant material in sediments of Buzzards Bay, Massachusetts, USA, Mar. Biol. 90:129-137
- Buchsbaum, R., J. Wilson and I. Valiela, 1986, Digestibility of plant constituents by Canada geese and Atlantic brant, Ecology 67:386-393
- Wilson, J.O., R. Buchsbaum, I. Valiela and T. Swain, 1986, Decomposition in salt marsh ecosystems: Phenolic dynamics during decay of litter of Spartina alterniflora, Mar. Ecol. Prog. Ser. 29:177-187
- Sebacher, D., R.C. Harriss, K.B. Bartlett, P.M. Crill, and J.O. Wilson, 1985, Atmospheric methane sources: Amazon River Floodplain, Abstract, EOS Trans. AGU 52:822
- Wilson, J.O., I. Valiela, and T. Swain, Carbohydrate dynamics during decay of litter of Spartina alterniflora, Mar. Biol. (in press)
- Wilson, J.O., P.M. Crill, K.B. Bartlett, D.I. Sebacher, and R.C. Harriss, Seasonal variation of methane emissions from a temperate Virginia swamp, in prep
- Crill, P.M., K.B. Bartlett, J.O. Wilson, D.I. Sebacher, R.C. Harriss, J.M. Melack, L. LeSack, and L. Smith-Morrill, Tropospheric methane from an Amazonian floodplain lake, in prep
- Crill, P.M., K.B. Bartlett, D.I. Sebacher, R.C. Harriss, J.O. Wilson, J. Melack, L. LeSack, L. Smith-Morrill, 1986, Methane budget of an Amazonian floodplain lake, Abstract, EOS Trans. AGU 67:249

Patent applications: None

Work in progress:

Completion of data analysis and publication of results of a seasonal study of variation of methane emissions from a temperate Virginia swamp. Completion of data analysis of methane emissions from tropical Amazon floodplain and publication of results.

Future position and address:

AAAS Science, Engineering and Diplomacy Fellow; Agency for International Development, Bureau for Latin America and the Caribbean

Dr. John O. Wilson
U.S. AID
LAC/DR/EST
Room 2239 New State
Washington, D.C. 20523

Ph: (202) 647-8048

Research summary:

Measurements made in Amazon River floodplain habitats demonstrated significant, though variable, releases of methane. Ebullition was the dominant mechanism of methane release. Estimates of regional annual production of methane indicate that tropical wetlands are important sources of atmospheric methane.

Methane emissions from a Virginia swamp also varied widely. Rapid fluxes occurred in spring and summer, and low fluxes in winter. Temperature and water depth significantly influenced rates of methane release. Extrapolating from the observed annual flux suggests temperate wetlands account for 15-25% of global wetland methane production, and 3-10% of total global production.

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Suggested Format for Termination Report

- Name MOHAN G. HEBSUR
 - Date 15 JULY 86.
 - Place of tenure NASA-LeRC, Cleveland.
 - Dates of tenure 1/16/84-7/15/86
 - Research Adviser Dr. R. V. MINER.
 - If on leave from a professional post, position title -
 - International posts held during tenure -
 - Travel on tenure (give places and dates): List Attached
 - a. Scientific seminars and meetings attended (list foreign meetings separately), visits for consultation, etc.
 - b. Seminars or lectures given at universities and institutes
 - c. Meetings attended by specific invitation HOST -workshop on TBC. May. 1985. Cleveland.
 - Teaching, if any, as an Associate -
 - Publications and papers resulting from research as an Associate (single-spaced, please) see list attached
 - Patents applied for resulting from research as an Associate -
 - Work in progress see list attached.
 - Future position and address (or forwarding address)
NASA-LeRC. M.S. 49/3.21000, Brook Pk. Rd. Cleveland. OH-44135
 - Summary of research during Associateship (100 words or less, single-spaced) Attached.
 - Appraisal of the Associateship Program:
 - a. General comments Good.
 - b. Usefulness to you Very useful.
 - c. Suggested improvements Timely decisions on requests
- for Extension, IAP-66, & Travel will help a lot.

8/24/84

Mohan G. Hebsur
15 July 86.

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LIST OF PUBLICATIONS:

1. Mohan G. Hebsur and Robert V. Miner, "Strain Range Partitioning Analysis of Coated PW1480 Single Crystal Alloy." To be published in the Proceedings Conference on 'Low Cycle Fatigue-Direction for the Future,' Lake George (New York), October 1985.
2. Mohan G. Hebsur and Robert V. Miner, "Influence of NiCoCrAlY Coating on LCF Behavior of PW1480 Single Crystal Superalloy." presented at the TMS Fall Meeting, Toronto, Canada, October 1985.
3. Mohan G. Hebsur and Robert V. Miner, "An Investigation of an Influence on Environment on the Creep Behavior of Low Pressure Plasma Sprayed NiCoCrAlY Coating Alloy." presented at the Thermal Barrier Coating Workshop, NASA Lewis Research Center, Cleveland, May 1985.
4. Mohan G. Hebsur and Robert V. Miner, "Elevated Temperature Tensile and Creep Behavior of Low Pressure Plasma Sprayed NiCoCrAlY Coating Alloy." Communicated to Mat. Sci. and Engrg., October 1985.
5. Mohan G. Hebsur and Robert V. Miner, "Isothermal and Cyclic Oxidation Studies on PW1480 Single Crystal Alloy." Communicated to J. Mat. for Energy Systems, October 1985.
6. Mohan G. Hebsur and Robert V. Miner, "High Temperature Creep Behavior of NiCoCrAlY in Air and Vacuum." Communicated to Thin Solid Film, October 1985.
7. R. V. Miner, J. Gayda, and M. G. Hebsur, "Creep-Fatigue Behavior of NiCoCrAlY Coated PWA1480 Superalloy Single Crystals." NASA TM 87110, October 1985.
8. Mohan G. Hebsur and Robert V. Miner, "Elevated Temperature Tension, Compression and Stress-Rupture behavior of PWA1480." NASA TM. May 1986.

WORK IN PROGRESS:

1. Influence of NiCoCrAlY Coating on the Creep Behavior of a Single Crystal Superalloy.
2. Influence of Strain Rate on the Tension/Compression Flow Behavior of an 001 Oriented Single Crystal Superalloy.
3. Isothermal and Cyclic Oxidation Behavior of NiCoCrAlY Coating Alloy.
4. Compressive Creep Behavior of NiCoCrAlY Coating Alloy.
5. Influence of Environment on Stress Rupture and Creep Behavior of NiCoCrAlY.

List of technical meetings attended;

- (1) SUPERALLOY-84. Seven Springs, PA., Oct.1984.
- (2) AIME -Annual 85., NEWYORK,NY., JAN.85.
- (3) ASTM-LCF Conf.,Lake George,NY.,Oct.85.
- (4) ASM. Conf. on Fracture.,Salt Lake City,UT. Dec.85.
- (5) AIME-Annul 86. New Orleans,LA, March 86.
- (6) ASTM-MICON 86, Philedelphia,PA. May 86.

Summary of Research Work:

High temperature deformation(LCF,Creep& Tensile) and environmental degradation (Oxidation &Corrosion) mechanisms in NiCoCrAlY coated Ni base single crystal-superalloy,PWA1480 and freestanding NiCoCrAlY coating alloy have been established. These mechanisms are then used to develop the life prediction model of TMF behavior of coated PWA1480.

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Termination Report

- o Name: Kohji Kato
- o Date: August 1, 1986
- o Place of tenure: NASA Lewis Research Center
- o Dates of tenure: 8/26/85 - 8/25/86
- o Research Adviser: Dr. D. H. Buckley (August/85-April/86)
Dr. S. V. Pepper (May/86-August/86)
- o Leave from a professional post: None
- o International posts held during tenure: None
- o Travel on tenure: Atlanta/USA - ASLE/ASME Tribology Conference, 10/5-10/8/85
Toronto/Canada - ASLE Annual Meeting, 5/1-5/14/85
- o Teaching: None
- o Publications and papers: None as yet, two manuscripts of papers in progress.
- o Patents: None
- o Work in progress: Writing of two manuscripts.
- o Future position and address:

Associate Professor in Tohoku University
Mechanical Engineering Department, Faculty of Engineering,
Sendai 980, Japan

(Home: 3-16-8 Yagiyama-Minami, Sendai 982, Japan)
- o Summary of research during Associateship:

Two kinds of research works were done during my associateship at LeRC.

(1) The effect of adsorbed gases on friction between silicon-nitrides --
It showed humidity in air had large effect on friction and oxygen had
little effect.

(2) The effect of adsorbed gases on friction between polyimide and silicon-
nitride -- It showed the friction coefficient of this pair was very
small (< 0.03) under the optimum amount of adsorption of gases in
vacuum.

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TERMINATION REPORT

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Name: Chun-Liang Lai

Date: August 1, 1986

Place of Tenure: NASA-Lewis Research Center at Cleveland

Dates of Tenure: June 19, 1984 - August 26, 1986

Research Adviser: Dr. An-Ti Chai

Travel on Tenure: Stockholm, Sweden, Oct. 5-13, 1985

Publications:

- (1) Surface Temperature Distribution Along a Thin Liquid Layer Due to Thermocapillary Convection (NASA TM 87115)
- (2) Unsteady Thermocapillary Flows and Free Surface Oscillations in Reduced Gravity Environments (in preparation)
- (3) Experimental Study of Thermocapillary Flows With Heat Fluxes Imposed on the Free Surface (in preparation)

Forwarding Address:

660, Chung-Cheng Road
Yong-Ho, Taipei, Taiwan
R.O.C.

Summary of Research Work:

Thermocapillary flows in two basic configurations, i.e., fixed end temperature and imposed heat flux, were studied during the Associateship.

The time lags of the velocity distribution and the free surface deformation with respect to the surface temperature variation and their effects on the free surface resonance were investigated for the fixed-end-temperature configuration.

The surface temperature distribution due to the thermocapillary convection in a 2-dimensional thin liquid layer with heat flux imposed on the free surface was studied both theoretically and experimentally. The end wall effects (insulating or conducting) on the flow structure were studied experimentally.

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Associate:

Rafael R. Manory

June 23, 1986

Center: NASA Lewis

Period: July 15, 85 - July 14, 86

Research Advisor: Dr. D. H. Buckley

Participation in professional meetings:

1. M.R.S. Symposium in Boston, December 1985
2. International Conference on Tribological Coatings - San Diego, April 1986
3. 3rd - AVS Meeting of the North Coast - Cleveland, June 2, 1986

Seminars: Microelectronics Center of North Carolina, Research Triangle Park, North Carolina. Seminar on June 13 on "Si deposition from SiCl_4 "

Publications:

1. Comment on a paper, J. Electrochem. Soc., in press (Aug. 1986).
2. A Simple Method for Monitoring Surface Temperatures in Plasma Treatments. J. Vac. Sci. and Technol., in press (Oct. 1986).
3. Protective Coatings of Metal Surface by Cold Plasma Treatments. NASA TM 87152; also "Plating and Surface Finishing" (in press 1986).
4. Effect of Ar and H_2 on the deposition of Si from SiCl_4 . NASA TM 87219; MRS Symp. Proc. 54, p. 715-722 (1985).
5. A Comparative Study of Deposition of Silicon from SiCl_4 in RF Plasma using Ar, H_2 or $\text{Ar}+\text{H}_2$. Submitted to Plasma Chem. Plasma Proc.
6. Decomposition of SiCl_4 and Deposition of Si in Inductively Coupled Plasmas of H_2+SiCl_4 - submitted to Plasma Chem. Plasma Proc.

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In Preparation:

7. X Ray Characterization of a New Constitutional Structure of the CaF_2 Type in the TiN System. (Prepared for Thin Solid Films).
8. The Effects of Plasma Parameters on TiN_x Films Deposited by Magnetron Sputtering (Prepared for Surface Engineering).
9. Deposition of Silicon Carbide from an Organochlorosilane by RF Plasma. (in final stages of preparation).

Work in Progress:

Determination of some tribological properties of TiN_x films on steels.

Also, deposition of silicon carbide on carbon composites by RF Plasma.

Forwarding Address:

M.S. 23-2, NASA Lewis Research Center,

Cleveland, OH 44135

Brief Summary of Research:

Titanium nitride films for wear protection were deposited by RF magnetron sputtering. The effect of plasma parameters on the structure and composition of the films was studied. A correlation between the properties and the deposition conditions was found to follow the value of the ratio between the total input power and the total nitrogen flow. The optimal deposition conditions were determined, and films with hardness values of more than 3200 Kg/mm^2 were obtained. The friction coefficient of such films vs a diamond stylus was measured and was found to be in the range of 0.08 -0.15. A very interesting finding of this work was the x-rays identification of a new phase in the Ti-N system having the CaF_2 structure. Another by-product of this study was a new method for monitoring surface temperatures in plasma environments using colored temperature indicators. Lately, some parts of the original program (deposition of SiC) was carried out and SiC films were deposited on carbon composite substrates using an organo-silane gas in RF plasma.

06/3-11/00
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TERMINATION REPORT
1 July 1986

JUL 3 1986

Dr. Nir Dan

ASSOCIATESHIP
OFFICE

Place of tenure: NASA Lewis Research Center, Cleveland Ohio 44135
Research Adviser: Bruce Banks Electro-Physics Office M.S. 302/1
Tenure begin 1 Aug 84, terminates 31 July 86
On leave Senior Research Associate Solid State Institute
Tecnion Haifa, Israel 32000.

Travel and Meetings:

- (1) Confer. on Metalurgical Coatings AVS Apr 85 Los Angeles Ca
 (3 oral papers)
- (2) North Coast AVS regional Meeting June 85 Cleveland Ohio
 (1 Poster paper in local meeting)
- (3) Am. Vac. Soc. Annual Conference Nov. 85 Houston Texas
 (1 poster paper)
- (4) Conference on Metalurgical Coatings AVS Apr 86 San Diego Ca
 (3 oral papers)
- (5) North Coast AVS Regional Meeting June 86 Cleveland Ohio
 (1 oral paper in local meeting)

Consultations:

- (1) In many subejects to many people in Lewis Research Center
- (2) Diamondlike Technology T. Donovan US Navy
 D. W. Hoffman Ford Company
 G. Thompson Commonwealth Scientific

Publications:

- (1) D. Nir "Space charge effects and dynamic interaction in the use of broad and intense ion beam bombarding insulated substrate", - accepted for publication Vacuum (1986)
- (2) D. Nir, "Dynamic interaction of floating substrates with an ion beam from 3 grids microetch system operated without neutralizer" - accepted for publication Vacuum (1986)
- (3) D. Nir " Mechanical protection of DLC films on fused silica slides" - NASA TM -87056
- (4) D. Nir "Protection of diamondlike carbon films on fused silica slides from erosion by impact of particles" - Accepted for publication Thin Solid Films (1986)
- (5) D. Nir " Surface damage evolution and optical performance of beadblasted fused silica" - accepted for publication Wear (1986)
- (6) Michael J. Mirtich, Dan Nir, Diane M. Swec and Bruce A. Banks "Diamondlike carbon protective coatings for IR materials" -NASA TM-87083
- (7) Michael J. Mirtich Dan Nir, Diane M. Swec and Bruce A. Banks "Diamondlike carbon protective coatings on IR materials" -accepted Thin Solid Films (1986)
- (8) Dan Nir and Michael J. Mirtich "Thin films growth rate effects in primary beam deposited diamond like carbon" - accepted J. Vac. Sci. Tech. (1986)
- (9) M. J. Mirtich, D. Nir, D. Swec and B. A. Banks "Summary abstract: The use of intermediate layers to improve the adherence of diamondlike carbon films on ZnS and ZnSe" - accepted J. Vac. Sci. Tech. (1986)
- (10) D. Nir "Summary abstract: Energy dependence of the stress in diamondlike carbon films" -accepted J. Vac. Sci. Tech. (1986)
- (11) D. M. Swec, M. J. Mirtich, D. Nir and B. A. Banks "Summary abstract: Comparison of protective coatings for IR transmitting windows" - accepted J. Vac. Sci. Tech. (1986)

Proposed papers on finised and partly performed experiments

- (12) D. Nir "Stress in diamondlike carbon film and its dependence on the deposition parameters" -to be submitted to Thin Solid Films (1986)
- (13) D. Nir "Elastic recovery of the impression of pyramidal indenter"

(14) D. Nir and M. J. Mirtich "The behaviour of coated substrate under loaded pyramidal indenter of microhardness tester"

(15) M. J. Mirtich and D. Nir "Surface hardening of ZnS and ZnSe by implantation"

(16) D. Nir "Electrical properties of diamondlike carbon films grown from RF plasma of CO₂ and C₂H₂ mixture"

Summary of research

The achievements of the research were twice the proposed ones. Five techniques for diamondlike deposition were used and additional high rate RF deposition technique was constructed with my imported knowledge. Coated samples were submitted to users. Four additional technologies were developed. Film protection was quantitatively measured by using beadblasting. Ge intermediate layer was found to improve drastically the adhesion of DLC to some substrates. Some factors affecting the stress in the film were identified experimentally and explained theoretically. Procedure was found to separate the microhardness of films from the contribution of the substrate. Many papers were published.

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JUN 18 1986

ASSOCIATESHIP
OFFICE

Name: Surendra Nath Tewari Date: 6/5/86

Place of tenure: NASA-Lewis Research Center
Cleveland, Ohio 44135

Dates of tenure: Jan 3, 1984- June 2, 1986

Research advisor: Dr. R. V. Miner

Position: on leave from Defence Metallurgical
Research Lab, Kanchanbagh, Hyderabad,
India. Scientist 'D'.

Travel on tenure:

(a) Scientific seminars to present papers

- (1) "A Critical Examination of Dendritic Growth Theories- Comparison with Experimental Data", Metallurgical Society Fall Meeting, Toronto, Canada, Oct. 1985.
- (2) "Effect of Undercooling on the Microstructure of Ni-Mo Alloys", Metallurgical Society Fall Meeting, Toronto, Canada, Oct. 1985.
- (3) "Undercooled and Rapidly Quenched Ni-Mo Alloys", Metallurgical Society Annual Meeting, New Orleans, March 1986.

(b) Other travel

- (1) Metallurgical Society Annual Meeting, Detroit, Sept. 15-19, 1984.
- (2) Project related visit to Massachusetts Institute of Technology, Nov. 19, 1984.
- (3) Gordon Conference on Microgravity Materials Processing, New London, New Hampshire, Aug. 19-23, 1985.
- (4) Gordon Conference on Crystal Growth, Plymouth (N.H.) July 14-19, 1985.
- (5) Grumman Aerospace Research and Development Center, Beth Page, New York, 1986.

Publications:

Papers published/accepted for publication.

- (1) "Effect of Undercooling on the Microstructure of Ni-35 % Mo (Eutectic) and Ni-38 % Mo (Hypereutectic) Alloys", S.N. Tewari, to appear in Metallurgical Transactions.
- (2) "Microstructure in Rapidly Solidified Ni-Mo Alloys", N. Jayaraman, S.N. Tewari, K.J. Helmker, T.K. Glasgow, Rapidly Solidified Materials, Ed. Peter W. Lee and Robert S. Carbonara, ASM (1986), pp.243-248. (Also published as NASA TM-87100, 1985).
- (3) "Undercooled and Rapidly Quenched Ni-Mo Alloys", S.N. Tewari and T.K. Glasgow (To appear in Proc. of Hume Rothery Symposium on Undercooled Alloy Phases, New Orleans, March 1986), Also Published as NASA TM-87257, 1985.
- (4) "A Critical Examination of the Dendrite Growth Models: Comparison of Theory with Experimental Data", S.N. Tewari and V. Laxmanan (To appear in Acta Metallurgica).
- (5) "Dendrite Characteristics in Directionally Solidified Pb-8 % Au and Pb-3 % Pd Alloys", S.N. Tewari (To appear in Metallurgical Transactions).
- (6) "Cellular Dendritic Transition in Directionally Solidified Binary Alloys", S.N. Tewari and V. Laxmanan (To appear in Metallurgical Transactions).
- (7) "Dendritic Microstructure in Argon Atomized Superalloy Powders", S.N. Tewari and Mahendra Kumar (To appear in Metallurgical Transactions).

Papers submitted to journals.

- (1) "Fault Structures in Rapidly Solidified Ni-Mo Alloys", N. Jayaraman and S.N. Tewari (Metallurgical Transactions).
- (2) "Microstructural Studies of Melt Spun Ni-Mo Alloys", N. Jayaraman, S.N. Tewari T.K. Glasgow (Metallurgical Transactions).
- (3) "Undercooling in Ni-31 % Mo Alloy", S.N. Tewari (Journal of Crystal Growth).

Papers under preparation.

- (1) "Cellular Structure in Melt Spun Ni-Mo Alloys", S.N. Tewari and T.K. Glasgow.
- (2) "Microsegregation in Directionally Solidified Pb-8 % Au Alloy", S.N. Tewari.

Future position: Associate Professor

Department of Chemical Engineering
Cleveland State University
Cleveland, Ohio 44115

SUMMARY OF RESEARCH

Ni-Mo alloys of hypoeutectic, eutectic and hypereutectic compositions were studied for their microstructural response to undercooling (Differential Thermal Analysis and Electromagnetic Levitation methods) and Chill Block Melt Spinning. Recalescence rate of undercooled alloys was studied as a function of the primary phase to nucleate and the degree of undercooling. Dendrites of γ and β (NiMo) were observed in these alloys. Degenerate eutectic microstructures were studied. Microstructures across the melt spun ribbons shows planar, cellular and dendritic features. Increase in solute solubility due to melt spinning resulted in faulted γ phase. Metallic glass was observed to form in Ni-Mo alloys.

Cellular/dendritic microstructural evolution in binary alloys was investi^{gated} from theoretical and experimental points of view. An extensive range of microstructural data reported in literature were compared against several dendritic growth models for alloy growth in a positive thermal gradient. The quantitative comparison of the theoretical predictions with the experimentally observed behaviour showed that there is a need to carry out experiments in microgravity to clearly distinguish between these models.

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JUN 23 1986

NATIONAL RESEARCH COUNCIL-RESEARCH ASSOCIATESHIP ASSOCIATESHIP
Termination report OFFICE

NAME: Ahobila Vajjula Murali Date: June 14, 1986

PLACE OF TENURE: NASA/JSC, SN2, TENURE: June 18, 1984 to
Houston, TX 77058. June 14, 1986

RESEARCH ADVISER: D. P. Blanchard,
Chief, Planetary materials branch,
NASA/ JSC.,SN2, Houston, TX 77058

<u>TRAVEL ON TENURE:</u>	<u>Place</u>	<u>Purpose</u>	<u>Dates</u>
1.	Radiation Center, OSU, <u>Corvallis</u> Oregon	To carry out analysis on the High resolution detectors at the Reactor site	May 21 June 9, 1985
2.	<u>San Francisco</u>	To attend AGU fall meeting/ present paper	Dec 8 Dec 13, 1985

<u>SCIENTIFIC</u>	<u>Conference/meeting</u>	<u>Dates</u>
<u>MEETINGS</u>		
<u>ATTENDED</u>	:1.Lun. Sci. Conf.,JSC.,Houston	March 11-15th, 1985
	2.Am. Geopys. Union. San Fransisco	Dec 8-13th, 1985
	3.Work-shop " Tectonic evolution of Green-stone belts".LPI., Houston	Jan 16-18th, 1986
	4.Lun. Sci. Conf.,JSC.,Houston	March 17-21st, 1986

SEMINARS

GIVEN DURING

<u>THE TENURE</u>	<u>Title</u>	<u>Institute</u>	<u>Date</u>
	Did manganese nodules record the C-T event?	Lunar and Planetary Institute	October 4, 1985

PUBLICATIONS(including the papers presented in the Scientific Conferences)

<u>Title</u>	<u>Authors</u>	<u>Reference</u>
1. Chemical signatures at the cretaceous-Tertiary boundary within a single manganese nodule.	A.V. Murali D.P. Blanchard B.L.K. Somayajulu & J.C. Laul	Lun. Planet. Sci. XVI, 597-598, 1985.
2. A probable occurrence of well preserved meteorite ablation material from the upper Jurassic of Poland.	M.E. Zolensky A.V. Murali & W. Brochewicz- Lewinski	Lun. Planet. Sci. XVI, 940-941, 1985.
3. REE abundances and cerium anomalies at Cretaceous-Tertiary boundary: Studies on manganese nodule Zetes 3D	A.V. Murali D.P. Blanchard B.L.K. Somayajulu & J.C. Laul	Geochim. Cosmochim. Acta (To be revised)
4. Impactite and tektite glasses from Lonar Crater, India.	A.V. Murali M.E. Zolensky M.A. Sommer & D.P. Blanchard	EOS <u>66</u> , 948, 1985. (POSTER PRESENTATION)
5. Impactite and tektite-like bodies from the Lonar Crater, India.	A.V. Murali M. Zolensky M.A. Sommer & D.P. Blanchard	Nature (To be revised)
6. Tektite-like bodies from Lonar Crater, India.	A.V. Murali M.E. Zolensky M.A. Sommer & D.P. Blanchard	Lun. Planet. Sci. XVII, 579-580, 1986.
7. Deccan province alkali basalts and xenoliths: Isotope systematics	K. Pande J.D. Macdougall P. Krishnamurthy K. Gopalan A.V. Murali & D.P. Blanchard	Conf. on Geochronology & Isotope Geology June-July, 1986.
8. Tektite-like bodies at the Lonar Crater, India: Implications for the origin of tektites	A.V. Murali M. Zolensky & D.P. Blanchard	Proc 17th Lun. Planet. Sci., Conf. 1986 (Submitted)

WORK IN PROGRESS

1. Cretaceous- Tertiary boundary Studies

Radiochemical determination of chemical signatures in the selected Mn nodule and Deccan basalt samples to evaluate the causes for the biotic extinctions ~60 my ago (i.e volcanism Vs Asteroid impact hypothesis).

2. Crustal genesis

Petrogenetic modeling of Deccan basalt volcanism.

3. Early crustal genesis

Chemical and isotope data evaluation of Sittampundi Anorthosite complex, India.

FUTURE POSITION AND ADDRESS : Visiting Scientist,
Lunar and Planetary Institute,
3303, NASA ROAD 1, Houston, TX 77058.

SUMMARY OF RESEARCH DURING ASSOCIATESHIP:

Precise geochemical and isotopic signatures have been obtained on diverse (selected) geological samples (ex: basalts, Mn nodules, impact crater glasses etc.,) to delineate the crust, mantle and extra-terrestrial signatures. These studies have provided significant insights in to the planetary evolution processes.

TERMINATION REPORT

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AUG 1 1986
ASSOCIATESHIP
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NAME: Dr. Marc Lee Pusey
DATE: August 1, 1986
TENURE: Biophysics, ES-76
Space Science Lab
NASA/MSFC
Huntsville, AL 35812
ADVISOR: Dr. Robert Snyder

TRAVEL:

To laboratory of Dr. Charles Bugg, University of Alabama,
Birmingham, ca. every 2 months.
9/21/84: Kalamazoo, MI

MEETINGS:

6/8-12/86; ASBC in Wash. DC
5/12-15/86; "New Directions in Protein Crystal Growth" at Joe
Wheeler St. Park, AL..
Aug./85; First International Conference on Protein Crystal Growth
at Stanford, CA..
4/21-26/85; FASEB in Anaheim, CA..
12/10-12/84; "4'th International Symposium on HPLC of Proteins,
Peptides, and Polynucleotides" in Baltimore, MD..
6/4-8/84; ASBC in St. Louis, MO..

PUBLICATIONS:

Pusey, M.L., Snyder, R., and Naumann, R. (1986) "Protein
Crystal Growth: Growth Kinetics for Tetragonal Lysozyme
Crystals", J. Biol. Chem. 261, 6524-6529

Pusey, Marc L. and Naumann, R. (1986), "Growth Kinetics of
Tetragonal Lysozyme Crystals", J. Cryst. Growth, in press.

Pusey, Marc L. (1986), "An Apparatus for Protein Crystal Growth
Studies", Analytical Biochemistry, in press.

DeLucas, L.J., Suddath, F.L., Snyder, R., Naumann, R.,
Broom, M.B., Pusey, M.L., Yost, V., Herren, B., Carter, D.,
Nelson, B., Meehan, E.J., McPherson, A., and Bugg, C.E. (1986),
"Preliminary Investigations of Protein Crystal Growth Using the
Space Shuttle", J. Crystal Growth, in press.

MANUSCRIPTS IN PREPARATION:

Pusey, M.L., Witherow, W., and Naumann, R., "Solatal Density
Gradient Driven Growth Plumes about Growing Lysozyme Crystals"

WORK IN PROGRESS:

Lysozyme crystal face growth rate measurements are being
continued, and have been expanded to include the effects of
forced flow on the growth rates. Preliminary data show that con-

tinued low velocity flow (<1mm/sec.) will dramatically reduce the linear face growth rate of small (10 - 50 um) lysozyme crystals, and the growth rate will not recover in the absence or increase of the flow. Nucleation rate studies are also being continued into an increasing range of temperatures and solvent conditions. In an effort to simplify the measuring process by using conductivity rather than absorbance techniques, it was found that there are other, possibly significant, conductivity changes occurring during the initial mixing period before any protein is known to precipitate. Initial speculations are that a means has been found to directly follow the surface changes which occur to drive the protein from solution. If so, this will be a valuable tool in investigating all aspects of protein-solution interaction. All major parts for construction of a relative light-scattering apparatus have been delivered, and assembly of the instrument is to begin immediately. Thermopiles for use in a microcalorimeter have also been delivered, and the associated hardware is under construction. Also, experiments are underway to determine protein solubility curves by directly following the rate of loss or gain of crystalline mass by means of a nanogram sensitive fishpole type balance. The device is simple to construct, and the early results are very encouraging. If the method is successful, then it will enable rapid determination of points for the protein phase diagram (2-3 days vs 2-3 months currently required).

SUMMARY OF RESEARCH DONE:

Research into the solutal concentration gradients about growing protein crystals, with emphasis in interpretation and follow-up work on their effects on the subsequent growth environment. Experimental evidence shows solutal density gradient driven flows at crystal sizes of 200 um, while calculations indicate significant concentration gradients will be established at crystal sizes > 10 um. Nucleation kinetics studies indicate that the nuclei generation rate is not controlled by the collisional rate, but by other factors not yet determined. Preliminary experiments using light-scattering and calorimetric techniques have been done into crystal nucleation and growth.

FUTURE POSITION:

Space Science Lab
Biophysics, ES-76
NASA/MSFC
Huntsville, AL 35812

JUL 18 1986

FINAL REPORT TO THE NATIONAL RESEARCH COUNCIL

Dr. Lee A. Reinleitner

July 15, 1986

PLACE OF TENURE: Marshall Space Flight Center
Huntsville, Alabama

DATES OF TENURE: June 7, 1984 - August 1, 1986

RESEARCH ADVISER: Dr. J. H. Waite, Jr.

TRAVEL (All travel was Domestic):

Fall meeting of the American Geophysical Union, San Francisco, CA,
December 2-8, 1984

International School for Space Simulation (ISSS-2), Kapaa, Kauai, Hawaii,
February 3-16, 1985

Fall meeting of the American Geophysical Union, San Francisco, CA,
December 9-15, 1985

Spring meeting of the American Geophysical Union, Baltimore, MD,
May 19-23, 1986

PUBLICATIONS:

Reinleitner, L. A., and E. Nielsen, "Self-Consistent Analysis of High-Drift Velocity Measurements with the STARE System", Published in Results of the ARCAD 3 Project and Recent Programs in Magnetospheric and Ionospheric Report, 1984.

Manuscripts being submitted:

Reinleitner, L. A., D. L. Gallagher, and D. A. Gurnett, "Ion Cyclotron Resonance with Thermal Helium and Hydrogen Near the Plasmopause", to be submitted to J. Geophys. Res.

Gallagher, D. L. and L. A. Reinleitner, "Rest Frame Spectrum of Ion Acoustic Waves in the Earth's Magnetosheath", to be submitted to J. Geophys. Res.

WORK IN PROGRESS: An interesting event has been observed in the RIMS data showing a Pc5 magnetic pulsation effect on ions on both sides of the plasmopause. This event is being analyzed to try to determine the effect of variations in density and composition on the nature of the pulsation.

SUMMARY OF RESEARCH AS AN ASSOCIATE

As an associate I performed studies of wave-particle interactions using the RIMS detector on the DE-1 spacecraft. The first simultaneous observation of both He⁺ and H⁺ flux variations due to an ion cyclotron wave was studied. I compiled a survey of over 100 cases of Pc5 magnetic pulsations observed in the RIMS data, which is now available for various studies. An analysis of "festoon-shaped" features in ISEE-1 plasma wave data was completed with Dr. D.L. Gallagher. The features are consistent with Doppler shifted ion acoustic waves in the Earth's magnetosheath, propagating upstream toward the bow shock, but convected downstream with the plasma flow.

FUTURE POSITION AND ADDRESS:

My future position will be as a Research Associate at the Geophysical Institute of the Univ. of Alaska, Fairbanks. My address should be (after mid-August the C/O line is not necessary):

Dr. Lee A. Reinleitner
C/O Dr. J. R. Kan
Geophysical Institute
University of Alaska
Fairbanks, AK 99775-0800

ATTACHMENT II
Overdue Reports

Hans-Ulrich Käufl

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JUL 8 1986

8086 Neufahrer

Münchenes Stos

ASSOCIATESHIP
OFFICE

July 19th, 1986

T E R M I N A T I O N R E P O R T

tenure at NASA/GSFC, January 18th, 1985 till May 3rd, 1986
my research advisor was M.J. Mumma

travel during tenure:

a) observational trips:

Nov. 26th-Dec. 5th 1985

Heterodyne observations of Venus, Comet Halley and the Earth's
stratosphere with the McMath Solar telescope at Kitt Peak, Az.

June 11th- 25th 1985

Set up of a new heterodyne receiver at the McMath Solar telescope
at Kitt Peak, Az. Observations of Solar oscillations and the
Venusian atmosphere.

April 1st- 20th 1986

Observations of comet Halley with the NASA/GSFC heterodyne
receiver at the 3m IRTF on Mauna Kea, Hawaii

b) seminars and meetings

Invited speaker at the astrophysical colloquium of Cornell
university (Feb. 1985)

attended CLEO-meeting in Baltimore (May 1985)

Invited speaker at the scientific colloquium of Colgate
university (Oct. 85)

attended AAS/DPS meeting in Baltimore, two poster talks
(Oct. 85)

seminar talk given at the NAVAL RESEARCH LAB, Washington DC
(March 86)

seminar talk given at University of California at Berkeley
(April 86)

seminar talk given at University of Hawaii at Manoa
(April 86)

publications:

Infrared Helioseismology: Detection of the chromospheric mode
D. Deming, D.A. Glenar, H.U. Käufel, A.A. Hill and F. Esenak
(in press in Nature)

work in progress:

additional analysis of solar oscillation data
introduction of infrared photometry as a technique to observe
solar oscillations
development of a 30 μm CO₂-laser as a local oscillator for
heterodyne spectroscopy

future position:

Experimental Infrared Astronomer at the Max-Planck-Institut
für extraterrestrische Physik, D-8046 Garching, West Germany

summary of research at NASA/GSFC

An optically pumped waveguide NH₃-laser has been designed and
built as a local oscillator for astronomical heterodyne observations
in the 12-13.5 μm region. A dedicated spectrometer to be used with
this laser has been set up at the McMath Solar telescope at Kitt
Peak Az. It has been used to observe Solar oscillations, winds
on Venus and the terrestrial stratosphere. A new CO₂-laser has
been proposed, first experiments and funding have been initialized.
It was successfully shown, that IR photometry is a competitive
technique to study Solar oscillations, especially from space.

RECEIVED
JUN 9 1986

National Research Council Associateship termination report

**ASSOCIATESHIP
OFFICE**

Name: Paul A. Newman

Tenure location: NASA Goddard Space Flight Center
Code 616
Greenbelt, MD 20771

Research Advisor: Mark R. Schoeberl

Dates of Tenure: 7/23/84 to 5/5/86

Tenure Travel: Satellite data users meeting
Boulder, CO 9/24/84 to 9/26/84

Fifth conference on the meteorolgy of the statosphere and
mesosphere. Boulter, CO 4/23/85 to 4/26/85

Harvard Universtiy
Cambridge, MA 10/11/85

Universtiy of Washington, Boeing Aerospace Co.
Seattle, WA 2/10/86 to 2/11/86

Publications: Horizontal Mixing Coefficients for Two Dimensional Chemical
Models Calculated from NMC Data. Paul A. Newman, Mark R.
Schoeberl and R. Alan Plumb, In press, JGR

Nimbus 7 SBUV/TOMS Measurements of the Springtime Antartic
Ozone Hole. R. S. Stolarski, A. J. Krueger, M. R. Schoeberl,
R.D. McPeters, P. A. Newman, and J.C. Alpert. Submitted to
Nature, 1986

Horizontal Diffusion Coefficients derived from Quasi-Geostrophic
Potential Vorticity. Paul A. Newman, Mark R. Schoeberl, R. Alan
Plumb, and Joan Rosenfield. In preparation, 1986

Work in Progress: Antartic ozone hole
Horizontal diffusion

Future Address: Dr. Paul A. Newman
Applied Research Corp.
8201 Corporate Drive, Suite 920
Landover, MD 20785

Research Summary:

During my NRC tenure, I have looked at latitude-height (2-dimensional) models of the atmosphere. These models were originally inconsistent in their employment of dynamic parameters, particularly in reference to horizontal diffusion. My results have pointed up this inconsistency, and have led to some significant improvements in 2-D models.

Additionally, I have been looking at the dynamical aspects of the Antartic ozone hole. The problem is defined by the catastrophic reduction of total ozone over the Antartic during the Southern fall. I have discovered several observational aspects of the problem, and I am continuing my efforts with this problem.

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JUN 23 1986

National Research Council - Research Associateship Program
Termination Report

ASSOCIATESHIP
OFFICE

Richard Alan Schwartz
Jet Propulsion Laboratory
Advisor - Dr. A. S. Jacobson

June 17, 1986
4/23/84-4/23/86

Travel on Tenure

6/11/84-6/13/84 Baltimore, Md.
164th Meeting of the American Astronomical Society

7/30/84-8/03/84 Stanford, Ca.
Gamma-ray Burst Workshop

6/03/85-6/07/85 Charlottesville, Va.
166th Meeting of the American Astronomical Society

10/8/84-10/12/84 Berkeley, Ca.
Collaboration with Dr. Robert P. Lin on flare papers.

9/30/85-10/04/85 Lanham, Md.
Fast Fluctuations in Solar Flares Workshop

Publications

Gamma-ray Burst Variability Above 4 MeV, Schwartz, R. A., Ling, J. C., Mahoney, W. A., Wheaton, Wm. A., and Jacobson, A. S., 1985, 19th International Cosmic Ray Conference, Vol. I, p. 51.

Gamma-ray Burst Localization by HEAO 3, Schwartz, R. A., Ling, J. C., Mahoney, W. A., and Jacobson, A. S., submitted to the Astrophysical Journal in June 1986.

High Spectral Resolution Measurements of a Solar Flare Hard X-ray Burst, Lin, R. P. and Schwartz, R. A., submitted to the Astrophysical Journal on May 29, 1986.

Works in Progress

Apparent Limb Occultation of the Fast Electron Target at the Time of a Gamma-Ray Peak During the 4 April, 1981 Solar Flare, to be submitted to the Astrophysical Journal

A Catalog of HEAO 3 Gamma-ray Bursts, for the Astrophysical Journal Supplement

Present Position

Senior Scientist for SASC Technologies working at GSFC on the Solar Maximum Mission Hard X-ray Burst Spectrometer

NASA-GSFC
Code 602.6 HXRBS
Greenbelt, Md. 20771

Summary of Research

My research at JPL focused on gamma-ray bursts and solar flares using the anti-coincidence shield data of HEAO 3. Using the computer, we searched shield and central detector rates from the entire flight to find 38 gamma-ray bursts, including 11 previously undiscovered bursts. I developed algorithms to obtain the burst arrival direction from the relative shield rates and ran Monte-Carlo codes to derive the shield response functions. I used these response functions to conclude that the 4 April, 1981 solar flare has a unique fast gamma-ray spike unaccompanied by any normal hard X-ray spike. This has never been detected in any other flare by any experiment.

ATTACHMENT III
Progress Reports

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

AUG 11 1986

Date: AUGUST 3rd, 1986

ASSOCIATESHIP
OFFICE

Associate Name: DESMOND ADAIR

Laboratory: NASA-AMES

Location: MOFFETT FIELD

Starting Date of Tenure 13th FEBRUARY, 1986

Adviser Name: VICTOR CORSIGLIA

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>✓</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>✓</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>✓</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>✓</u> | <u>—</u> |

Comments:

ALL OF THE ABOVE HAVE PROVED VERY SATISFACTORY

over...

2/5/85

101

II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

I AM VERY PLEASED WITH MY RECEPTION AT THIS BRANCH. MY SUPERVISOR AND HIS COLLEAGUES HAVE PROVED TO BE VERY ENCOURAGING AND HELPFUL, AND ARE KEEN TO SEE A SUCCESSFUL OUTCOME TO THE RESEARCH.

Brief resume of progress:

EXPERIMENTAL: - THE MULTIELEMENT AEROFOIL CONFIGURATION HAS BEEN DESIGNED AND SUBMITTED FOR MANUFACTURE. MOST OF THE SOFTWARE NECESSARY FOR THE RUNNING OF THE L.D.A. AND HOT-WIRE MEASURING SYSTEMS HAS BEEN WRITTEN. THE L.D.A. SYSTEM IS CURRENTLY BEING TESTED USING AN AXISYMMETRIC JET TO IMPROVE THE MEASUREMENT OF TURBULENCE QUANTITIES.

CALCULATIONS: - AN INVERSE BOUNDARY-LAYER CALCULATION METHOD HAS BEEN WRITTEN. THIS IS CURRENTLY BEING EXTENDED INTO THE DOWNSTREAM WAKE. SOME WORK HAS BEEN DONE IN THE AREA OF GRID GENERATION.

General impression of program to date:

THE PROGRAM HAS GIVEN ME THE OPPORTUNITY TO MEET A MUCH BROADER SPECTRUM OF PEOPLE THAN IS FOUND IN SOME UNIVERSITIES. THEY ARE CONCERNED MORE WITH THE USEFULNESS, PRACTICALITIES AND LOGISTICS OF RESEARCH. THE OPPORTUNITY TO TAKE FUNDAMENTAL DECISIONS IS MOST REFRESHING.

Suggestions:

PROVISION OF A LIST OF SUITABLE HOTELS, CLOSE TO THE RESEARCH CENTER MAY BE USEFUL, BEFORE AN ASSOCIATE ARRIVES.

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JUL 25 1986

ASSOCIATESHIP
OFFICE

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 12 July 1986

Associate Name: Duane F. Carbon

Laboratory: NASA/Ames Research Center

Location: Moffett Field
Mountain View, CA

Starting Date of Tenure 6 Jan. 1986

Adviser Name: Dr. L. Caroff

I. Associateship Office Functions

Yes No

- | | | |
|---|-------------|-------------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | <u> </u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u> </u> | <u>N.A.</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>X</u> | <u> </u> |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | <u> </u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u> </u> | <u>N.A.</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u> </u> |

Comments:

over...

2/5/85

103

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	—
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	—
3. Is the space assigned reasonably adequate?	<u>X</u>	—
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	—	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	—
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	—
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	—
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	—	<u>X</u>

Comments

Brief resume of progress: In the past six months considerable progress has been made toward accomplishing the goals of my research proposal. A faster and more versatile version of my spectrum synthesis program is now running on the ARC CRAY. The new code uses only the subset of atomic and molecular lines that contribute significantly to the opacity of the spectral region being synthesized; the line selection is made by the ~~code~~ ^{program} at execution time based on the characteristics of the model atmosphere currently adopted. Gordon Augason, an ARC staff member, and I have developed an accurate set of H₂ molecular line parameters based on the latest laboratory studies and I have revised my code to accept a new, highly accurate representation of the molecular hydrogen partition functions and equilibrium constants. We are currently measuring stellar radial velocities using the CO and CN lines in the high resolution FTS spectra of our S-star sample. These will be used to accurately establish the expected stellar H₂ line positions.

General impression of program to date:

I am very pleased with the program thus far. It has given me an opportunity to do good research in a stimulating and supportive environment.

Suggestions: I feel that it would be very helpful if a dental plan could be offered to the Associates. .

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JUL 7 1986

ASSOCIATESHIP
OFFICE

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 5th June 1986

Associate Name: Susan A. Lamb

Laboratory: NASA - Ames

Location: Moffett Field, California

Starting Date of Tenure 12th Dec. 1985

Adviser Name: Dr. Micheal Warner

I. Associateship Office Functions

Yes No

- | | |
|---|-----------------------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> <u> </u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>Not requested.</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>Not requested.</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> <u> </u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>✓</u> <u> </u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>None asked.</u> |

Comments:

over...

2/5/85

105

II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>✓</u> | <u>—</u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>✓</u> | <u>—</u> |
| 3. Is the space assigned reasonably adequate? | <u>✓</u> | <u>—</u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>—</u> | <u>✓</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>✓</u> | <u>—</u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>✓</u> | <u>—</u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>✓</u> | <u>—</u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u>—</u> | <u>✓</u> |

Comments:

All concerned have been very helpful. My time at Ames has been both enjoyable and productive.

Brief resume of progress:

Please see attached.

General impression of program to date:

Well run, useful program.

Suggestions:

The level of secretarial support at this center is not adequate for the scientific personnel here. This problem is made worse by the large amount of paper work involved in a government operation. Multiplying the number of secretaries by three would be a help.

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Brief Resume of Progress

My work on theoretical predictions of the intensity of star formation during galaxy-galaxy interactions, based upon the dynamical calculations of Miller and Smith, is well underway in a collaborative effort with Bruce Smith. I am also collaborating with Smith, Michael Werner and Howard Bushouse on an observational investigation of interacting galaxies using IRAS (infrared) data. I recently visited the IPAC (Infrared Processing and Analysis Center) at CalTech where I acquired considerably more data. I will continue to participate in both projects after my return to the University of Illinois in August 1986.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: July 24, 1986
Associate Name: James Harmer
Laboratory: NASA Ames
Perception
Location: Moffett Field, CA
Starting Date of Tenure: ~ Jan 20
Adviser Name: A. B. Watson

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JUL 25 1986

ASSOCIATESHIP
OFFICE

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	—
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	—
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	—
3. Is the space assigned reasonably adequate?	<u>X</u>	—
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>X</u>	—
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	—
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	—
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	—
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	—	<u>X</u>

Comments:

A questionnaire that only allows yes or no answers will not measure very much. None of the above were exactly yes or no, but usually somewhere in between - on half full cup is not empty.

Brief resume of progress:

I have been interacting regularly and intensely with members of the vision research community in the Bay Area. I am working on two projects. One dealing with adaptation to chromatic light - that is moving along nicely. The other project involves noise compression in the chromatic channel.

General impression of program to date:

that is moving much more slowly.

The Area vision/perception group is extremely strong.

Suggestions:

ST/P H/C

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: June 30, 1986

Associate Name: Scott A. Sandford

Laboratory: NASA/Ames Research Center

Location: Moffett Field, CA

Starting Date of Tenure January 10, 1986

Adviser Name: Francisco P. Valero

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	X —	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	X —	—
3. If requested, was the stipend advance available when you began tenure?	X —	—
4. Is the stipend being received regularly in a timely way?	X —	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	X —	—
6. Are your questions to this Office being handled courteously and efficiently?	X —	—

Comments: It would be useful if it were possible to receive a partial travel advance sooner than 2 weeks before travel. It is often difficult to pay the registration fees and hotel reservations for meetings, which must be sent in much earlier than 2 weeks prior to the meetings. Otherwise, everything seems to run very smoothly.

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	X —	—
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	X —	—
3. Is the space assigned reasonably adequate?	— X —	—
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	X —	—
5. Are you being encouraged to plan for publication of your research results in referred journals?	X —	—
6. Are you able to participate in local seminars, colloquia, etc.?	X —	—
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	X —	—
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	—	X —

Comments: The general set up here has worked very well. Unfortunately, the procurement branch here is extremely inefficient. It takes ridiculously long times for many purchased items to arrive at the laboratory. Shop support is often very slow as well.

Brief resume of progress: My paper on the use of solar flare tracks in cosmic dust particles has been accepted by Icarus and should be appearing in the journal soon. Lou Allamandola and I have gotten a large part of the laboratory in working order and began taking our first real data several weeks ago. Our early results will be presented in Wyoming at the Interstellar Processes Conference this week. A number of astronomical observations that have a bearing on our work are being considered.

General impression of program to date: The initial lab set up took longer than expected (largely due to delays in procurement) but work should proceed rapidly now that everything is underway. Our preliminary results are encouraging and we should be very busy for some time to come. The proposed work on carbonates may be delayed because the present work on the polycyclic aromatic hydrocarbons looks so promising.

Suggestions: I have no real suggestions for the NRC side of things except for the previously mentioned travel advances. The NASA support system is often substandard, especially in the areas of local shop support and procurement. Unfortunately the system is a big enough mess that I really can't think of suggestions that could improve the situation.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

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JUL 11 1986

ASSOCIATESHIP
OFFICE

Date: 30 June 1986

Associate Name: Mark R. Showalter

Laboratory: NASA/Ames Research Center

Location: Moffett Field, CA

Starting Date of Tenure 7 January 1986

Adviser Name: Jeffrey N. Cuzzi

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|---|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>X</u> | — |
| 3. If requested, was the stipend advance available when you began tenure? | <u>X</u> | — |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | — |

Comments:

over...

2/5/85

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II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | — |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | — |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | — |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u>X</u> | — |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | — |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | — |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | — |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | — | <u>X</u> |

Comments: A shortage of computer terminals at the lab has been a source of some frustration, but has been recently rectified.

Brief resume of progress: James Pollack and I have established procedures to measure the properties of Saturn's F Ring from the Voyager images; these measurements are now underway. Jeff Cuzzi, Luke Dones and I have held preliminary discussions of our proposed theoretical analysis of shepherding in Saturn's rings. Although outside my proposal, I have also developed a promising technique for constraining the size distribution in the rings, based on the statistical properties of the Voyager 2 photopolarimeter scan.

General impression of program to date: I have enjoyed working with both Jim Pollack and Jeff Cuzzi at NASA/Ames. In general, I have found the research facilities to be satisfactory.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

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JUN 30 1986

ASSOCIATESHIP
OFFICE

Date: 10 June 1986

Associate Name: Verhaegen, Michel

Laboratory: NASA Ames Research Center

Location: Moffett Field, CA 94035

Starting Date of Tenure 18 December 1985

Adviser Name: Heinz Erzberger

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u> </u>	<u>X</u>
4. Is the stipend being received regularly in a timely way?	<u>X</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	<u> </u>

Comments:

See Point A (of attached sheet)

over...

II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|-------------|-------------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>X</u> | <u> </u> |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>X</u> | <u> </u> |
| 3. Is the space assigned reasonably adequate? | <u>X</u> | <u> </u> |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | <u> </u> | <u>X</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>X</u> | <u> </u> |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>X</u> | <u> </u> |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>X</u> | <u> </u> |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | <u> </u> | <u>X</u> |

Comments:

Brief resume of progress:

See Point B.

General impression of program to date:

See Point C.

Suggestions:

See Point D.

A Comments (on start up period)

The difficulties with the requested advance may be due to the New Years period and therefore I certainly appreciate the efforts of Dr. R. Kinney and Dr. H. Erzberger to straighten things up.

B Brief resume of progress

Two main contributions have been made.

First, the original results in my Ph. D. dissertation were reviewed and those aspects of interest to Ames were elaborated. These results were written up for publication. (Systems and Control Letters (Journ.), 1, Automatica (Journ.), 1 and AIAA atmospheric flight mechanics conference, Williamsburg Aug. 1986, 1)

Second, a new technique to determine a nonlinear dynamic model, stability and control derivatives for an aircraft from inflight measurements and state reconstruction techniques has been developed. This procedure is numerically more attractive than existing alternatives in terms of numerical efficiency and reliability. This will first be evaluated by applying it to off-line flight data from a VTOL fighter aircraft. Subsequently the possibility of implementing this procedure on-line will be explored.

C General impression of program to date

The freedom in pursuing fundamental system theoretical research in an environment where the realization of practical applications is of utmost importance makes it personally very interesting and fruitful.

D Suggestions

Include dental care insurance plan if possible (may be optional for those only interested, or organized by the hosting laboratory)

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 7/30/86

Associate Name: Mark G. Wolfire

Laboratory: NASA Ames Research Center

Location: Mail Stop 245-3
Moffett Field, CA 94035

Starting Date of Tenure

11/21/85

Adviser Name: Larry Caroff and Pat Cassen

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AUG. 15 1986

ASSOCIATESHIP
OFFICE

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u> </u>	<u>X</u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	<u> </u>

Comments: My starting date form was improperly processed, resulting in a 2 month delay in my first check. Eventually it was sent by express mail. Now, I am quite pleased with the monthly stipend. The direct deposit service is especially convenient.

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u> </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>X</u>	<u> </u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u> </u>	<u>X</u>

Comments:

Brief resume of progress: My NRC proposal is to study the process of star formation. I have determined that radiation pressure alone is unable to disperse the gas and dust surrounding a low mass protostar. Additional sources of momentum deposition such as a stellar wind must also be important.

I have determined the structure of gas and dust surrounding 3 protostars in the Serpens molecular cloud by modeling their observed IR energy distributions. Also a study of extra-galactic star formation was recently begun. The infrared cooling lines from star forming regions will be used to probe the efficiency of star formation in these extra-galactic sources.

General impression of program to date:

An excellent program.

Suggestions:

I would appreciate a dental plan along with the major medical coverage.

*I am sorry this has taken so long to get back to you.
Sincerely, Paul Walther*

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

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AUG 1 1986
ASSOCIATESHIP
OFFICE

Date: 7/30/86

Associate Name: William H. Cabot

Laboratory: NASA-Goddard Institute for Space Studies

Location: 2880 Broadway, New York, NY 10025

Starting Date of Tenure 2/3/86

Adviser Name: Dr James Hansen

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>x</u>	___
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	___	___
3. If requested, was the stipend advance available when you began tenure?	___	___
4. Is the stipend being received regularly in a timely way?	<u>x</u>	___
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>x</u>	___
6. Are your questions to this Office being handled courteously and efficiently?	<u>x</u>	___

Comments:

over...

II. Laboratory functions

- | | <u>Yes</u> | <u>No</u> |
|---|------------|-----------|
| 1. Was the laboratory ready to receive you and help you get started? | <u>x</u> | — |
| 2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? | <u>x</u> | — |
| 3. Is the space assigned reasonably adequate? | <u>x</u> | — |
| 4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. | — | <u>x</u> |
| 5. Are you being encouraged to plan for publication of your research results in referred journals? | <u>x</u> | — |
| 6. Are you able to participate in local seminars, colloquia, etc.? | <u>x</u> | — |
| 7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? | <u>x</u> | — |
| 8. Have you encountered laboratory influences detrimental to your proposed research? Explain. | — | <u>x</u> |

Comments: The laboratory has provided no support for programmatic travel, which is frequently necessary in this project as many computations are being performed at NASA-Ames; NASA-Ames and I have incurred such travel costs.

Brief resume of progress: Much of the term has been spent setting up and testing numerical simulations of turbulent, convective media relevant to the geometry of the solar nebula. Several cases of convection without rotation have been successfully run, and statistical algorithms to analyze transport properties are being developed. I've developed equations for media with variable density and variable gravity, as well as transformations needed to include sheared rotation, and I'm working on computationally compatible forms.

General impression of program to date: So far I've a good impression of the program; I've had little interaction with its bureaucratic machinery in my day-to-day work, which I appreciate.

Suggestions:

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SEP 2 1986

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OFFICE

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 8/25/86

Associate Name: THOMAS J. CROWLEY

Laboratory: NASA/Goddard

Location: Greenbelt, MD

Starting Date of Tenure 2/1/86

Adviser Name: G. North

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>X</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>X</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u>—</u> |

Comments:

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>4/</u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>X</u>

Comments:

Great Opportunity! I've had a wonderful, stimulating time.

Brief resume of progress:

- 3 papers written
- 2 more in progress

General impression of program to date:

Excellent

Suggestions:

Keep it up

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

JUL 23 1986

ASSOCIATESHIP
OFFICE

Date: 24 July 1986

Associate Name: François-Xavier DÉSERT

Laboratory: Infrared Astrophysics Branch

Laboratory for Extraterrestrial Physics
Location: Code 697, NASA Goddard Space Flight Center
Greenbelt, Md 20771

Starting Date of Tenure

February 1986

Adviser Name: M. Hauser

I. Associateship Office Functions

Yes No

- | | | |
|---|---|-------|
| 1. Were the pre-start materials and instructions satisfactory? | X | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | — | N/A — |
| 3. If requested, was the stipend advance available when you began tenure? | X | — |
| 4. Is the stipend being received regularly in a timely way? | X | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | X | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | X | — |

Comments:

over...

2/5/85

125

II. Laboratory functions

Yes No

1. Was the laboratory ready to receive you and help you get started? X —
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? X —
3. Is the space assigned reasonably adequate? — —
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. — X
5. Are you being encouraged to plan for publication of your research results in referred journals? X —
6. Are you able to participate in local seminars, colloquia, etc.? X —
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? X —
8. Have you encountered laboratory influences detrimental to your proposed research? Explain. — X

Comments: The Office I share with another NRC associate D. Leisewitz and another person is a little tiny. This problem should be solved in few months. The contact with the laboratory people is eased by regular meeting on research progress.

Brief resume of progress:

The research proposal was about the infrared spectra of galaxies. As a first mandatory step, I have tried to understand the properties of dust in our galaxy, which converts the stellar light into infrared light. The evidence for the existence of large molecules (radius of 5\AA) and small grains ($< 100\text{\AA}$) is now overwhelming. I am writing few papers on the stability and infrared General impression of program to date: properties of these grains.

The NRC associateship program is a very good opportunity for the research I am involved in. The facilities at Goddard Space Flight Center (software, data handling, scientific environment) are very well suited for this research.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: AUG 26 1986
Associate Name: WILLIAM HYDE

Laboratory: G. S. F. C.

Location: GREENBELT, M.D.

Starting Date of Tenure 3/1/86

Adviser Name: DR. G. R. NORTH

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AUG 28 1986

ASSOCIATESHIP
OFFICE

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>✓</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>✓</u>	<u>—</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments: RE POINT 4. I AM EXPERIENCING
MAJOR PROBLEMS REGARDING COMPUTER

SOFTWARE (GRAPHICS, WORD PROCESSING). IF ALL THE
COMPUTERS OF A GIVEN TYPE (E.G. VAXES) ON BASE HAD ACCESS TO
A GRAPHICS / WORD PROCESSING PACKAGE, THERE WOULD BE LESS DUPLICATION
OF EFFORT.
Brief resume of progress:

STUDY OF ENERGY BALANCE ICE SHEETS CLIMATE
MODELS, PALEOCLIMATE SIMULATIONS, ICE SHEET-CLIMATE COUPLING.
STUDY OF THE 400,000 YEAR CLIMATE CYCLE AND ITS RELATION
TO THE ECCENTRICITY OF THE EARTH'S ORBIT. SUBMISSION
OF A PAPER ON PALEOCLIMATE SIMULATIONS TO J. CLIMATE SCI. (WITH DR.
W.R. PELTIER)

General impression of program to date:

EXCELLENT

Suggestions:

SEE COMMENTS.

CF/R-H/TS

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED
NRC-Associateship Office

AUG 18 1986

Date: August 14, 1986

Associate Name: Hideyo Kunieda

Laboratory: Laboratory for High Energy Astrophysics

Location: NASA/Goddard Space Flight Center

Starting Date of Tenure February 24, 1986

Adviser Name: Dr. Peter Serlemitsos

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>✓</u>	<u>See Comments</u>
3. If requested, was the stipend advance available when you began tenure?	<u>✓</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>✓</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓</u>	<u> </u>

Comments:

It took more than one month to receive the reimbursement of relocation, therefore my budget had to be tight during the first month (partly because of my under estimation of cost to settle in a foreign country).

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>✓</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>✓</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments:

How much money is available for us to spend in the laboratory?

Brief resume of progress:

To improve the spatial resolution of thin foil mirror, I examined the reasons of flaw in BBXRT. The main reason was not short wave (25nm) "orange peel" but longer wave and foil mis-argument. I am trying to change the rolling process and support system.

General impression of program to date:

I am impressed that we are received with very good treatment. I hope our work will keep the progress of the group here.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

AUG 26 1986

ASSOCIATESHIP
OFFICE

Date: 8/18/86

Associate Name: ELISSA LEVINE

Laboratory: NASA/GODDARD SPACE FLIGHT CENTER

Location: GREENBELT, MD

Starting Date of Tenure 3/3/86

Adviser Name: V. SALOMONSEN

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

II. Laboratory functions

Yes No

1. Was the laboratory ready to receive you and help you get started? ☒ ☐
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? ☒ ☐
3. Is the space assigned reasonably adequate? ☒ ☐
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. ☐ ☒ *
5. Are you being encouraged to plan for publication of your research results in referred journals? ☒ ☐
6. Are you able to participate in local seminars, colloquia, etc.? ☒ ☐
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? ☒ ☐
8. Have you encountered laboratory influences detrimental to your proposed research? Explain. ☐ ☒

Comments: * BECAUSE A MAJORITY OF MY RESEARCH IS IN ECOLOGY AND SOIL SCIENCE, MANY JOURNALS AND PUBLICATIONS ARE NOT AVAILABLE AT THE NASA LIBRARY. INTERLIBRARY LOANS ARE SLOW AND THERE IS A GREAT ADVANTAGE TO "BROWSING" IN LIBRARY STACKS. IF POSSIBLE, I WOULD RECOMMEND AN AGREEMENT BETWEEN THE NRC AND THE USDA AG. LIBRARY AND THE USGS FOREST LIBRARY, SUCH THAT (CONTINUED BELOW)

Brief resume of progress: I HAVE BEEN WORKING ON THE DEVELOPMENT OF A SOIL GENESIS SIMULATION MODEL. WORK SO FAR HAS INCLUDED LITERATURE REVIEW, TESTING OF EQUATIONS, AND COMPUTER PROGRAMMING. IN ADDITION, I HAVE TRAVELLED TO N.J. AND VERMONT TO COLLECT DATA AND SOIL SAMPLES FOR MODEL INPUT AND TESTING AND STATISTICAL ANALYSIS. I PLAN TO PRESENT GENERAL IMPRESSION OF PROGRAM TO DATE: A PAPER ON MY WORK AT THE AMERICAN SOCIETY OF AGRONOMY MEETING IN AUGUST. THIS PROGRAM HAS PROVIDED AN EXCELLENT OPPORTUNITY FOR MY RESEARCH WORK AND CAREER DEVELOPMENT. ACCESS TO NASA FACILITIES AND INTERACTION WITH OTHER SCIENTISTS IS REWARDING AND STIMULATING. IN ADDITION, IT PROVIDED EXPERIENCE IN SUGGESTIONS: PROCEDURES AND POLICIES OF NASA'S SYSTEM WHICH ALLOWING GREATER FREEDOM THAN IS ALLOWED CIVIL SERVANTS. I HAVE FOUND THIS PROGRAM TO BE EXTREMELY REWARDING AND HOPE TO CONTINUE IN A PRODUCTIVE MANNER.

* FELLOWS COULD CHECK OUT BOOKS AND MAKE FREE COPIES AT THESE LIBRARIES, AS IS PERMITTED AT GODDARD.

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AUG 8 1986

ASSOCIATESHIP
OFFICE

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: Aug 4, 1986

Associate Name: Mehmet E. Ozel

Laboratory: GSFC

Location: Greenbelt

Starting Date of Tenure Feb 10, 1986

Adviser Name: Dr. Carl Fichtel

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>✓</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>✓</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u>✓</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u>✓</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>✓</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>✓ (*)</u>	<u> </u>

Comments:

(*) mostly yes; however, still, my ^{air re-}imbursement for transport of my books and other research material is incomplete.

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>✓</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>✓</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>✓</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>✓</u>	<u>—</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>✓</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>✓</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>✓</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>✓</u>

Comments: Majority of balloon flight experiments are experiencing a difficult period in USA. Failure of balloons during the flight and loss of data and sometimes the instrument itself, unfortunately, a common phenomenon affecting all groups in the field. In our case, strong limitations imposed upon weight caused a long delay in the scheduled flight (which was due last fall). (To fulfill my original proposal and aim necessitates an extension of my stay at GSFC for a second year).

Brief resume of progress: I started working on the balloon payload orientation system. Telescope calibration and possible data analysis and software problems are other related topics in which I am directly involved. As a group we are preparing the instrument (the Advanced Compton Telescope) for a balloon flight this fall or next spring.

General impression of program to date: It was not foreseen that I was going to be involved in the hardware and instrument development phase of the experiment. However, I am very happy to join the group in this phase, which I find very stimulating and exciting. This will help me to understand better the later data taking, reduction and analysis phases and scientific outcomes.

Suggestions: (a) 1-yr (even 2 yrs) is rather short for programs which involve instrumentation, balloon (or satellite) flights, data reduction and analysis, and final interpretation!

(b) Personal visits and direct exchange of information among institutes within US are most valuable and should be further encouraged (forced)!

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 8 July 1986

Associate Name: D Aaron Roberts

Laboratory: NASA/GSFC

Location: Greenbelt, MD

Starting Date of Tenure 15 Jan 1986

Adviser Name: Melvyn L. Goldstein

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JUL 11 1986

ASSOCIATESHIP
OFFICE

I. Associateship Office Functions

Yes No

1. Were the pre-start materials and instructions satisfactory?

✓ but later than I had hoped.

2. If requested, was the relocation and travel advance handled in a satisfactory manner?

✗ (not requested)

3. If requested, was the stipend advance available when you began tenure?

✓

4. Is the stipend being received regularly in a timely way?

✓

~~5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?~~

✓

6. Are your questions to this Office being handled courteously and efficiently?

✓

Comments:

over...

2/5/85

II. Laboratory functions

Yes No

1. Was the laboratory ready to receive you and help you get started? ✓
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? ✓
3. Is the space assigned reasonably adequate? ✓
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? ✓
If so, explain below.
5. Are you being encouraged to plan for publication of your research results in referred journals? ✓
(SP)
6. Are you able to participate in local seminars, colloquia, etc.? ✓
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? ✓
8. Have you encountered laboratory influences detrimental to your proposed research? Explain. ✓

Comments:

This has been a very productive and enjoyable time.

Brief resume of progress: 1) Developed a method for studying "dynamic spectra" of cross-helicity and other solar wind quantities. Used this to show that "inward waves" (toward sun) are more prevalent than previously held, and that outward waves can be very pure in the quiet, slow solar wind. Also, showed that cross-helicity spectra do not generally change sign at low wavenumber, as predicted by a 2-D turbulence model. 2) Showed that the origin of f^{-2} spectra for the solar wind speed and $|B|$ time series is the power in coherent jumps; what is left on subtracting the jumps is characteristic of turbulence. 3) Helped to test and correct a technique (of Goldstein and Matthaeus) for correcting observations of wave propagation direction in regions of low Mach number. Papers on topics 2) and 3) have been submitted to J. Geophys. Res. for publication.

General impression of program to date:

Very good. My only complaint was how long it took to find out if I had been selected for a fellowship. I found out from ~~the~~ Goddard about a month after the selection was supposed to be made, and about a month before I got direct notification.

Suggestions: If possible, provide more prompt notification to candidates.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

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AUG 28 1986

ASSOCIATESHIP
OFFICE

Date: August 25/86

Associate Name: Ana V. Torres

Laboratory: Goddard Space Flight Center

Location: Greenbelt, MD

Starting Date of Tenure March 3, 1986

Adviser Name: Theodore Gull

I. Associateship Office Functions

Yes No

- | | | |
|---|----------|---|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | — |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>X</u> | — |
| 3. If requested, was the stipend advance available when you began tenure? | — | — |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | — |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | — |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | — |

Comments:

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u>—</u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u>—</u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u>—</u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u>—</u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u>—</u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u>—</u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u>—</u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>—</u>	<u>X</u>

Comments:

Brief resume of progress: I have completed a paper on Be stars that was presented at the Be star colloquium in Boulder (Aug 18-22) and was submitted for publication to the Astronomical Journal at the beginning of August. I am currently working on an Atlas of Wolf-Rayet stars and on the extinction curve towards NGC 6530.

General impression of program to date:

I am very satisfied with the program because the opportunities to do research without other distractions are better than in any other program.

Suggestions:

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

JUL 14 1986

ASSOCIATESHIP
OFFICE

Date: July 11, 1986

Associate Name: Saeqa D. Vrtilek

Laboratory: Laboratory for High Energy Astrophysics
NASA/Goddard Space Flight Center

Location: Greenbelt, MD 20771

Starting Date of Tenure January 6, 1986

Adviser Name: Dr. Jean H. Swank

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	—
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	—
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	—
4. Is the stipend being received regularly in a timely way?	<u>X</u>	—
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	—
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	—

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	—	X
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	X	—
3. Is the space assigned reasonably adequate?	X	—
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	X	—
5. Are you being encouraged to plan for publication of your research results in referred journals?	X	—
6. Are you able to participate in local seminars, colloquia, etc.?	X	—
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	X	—
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	X	—

Comments:

Please see attached sheet for comments.

Brief resume of progress:

Please see attached sheet.

General impression of program to date:

Please see attached sheet.

Suggestions:

Please see attached sheet.

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Comments for section II. Laboratory functions

JUL 14 1986

1. There was no office available for my first two months.

ASSOCIATESHIP
OFFICE

4. In spite of repeated inquiries, it has taken me almost 6 months to obtain, so far only in part, computer documentation essential to my data analysis. The available computer facilities, consisting of an antiquated PDP-11/70, a remote VAX (only available on evenings Monday thru Friday), and a overworked IBM, are at best marginally adequate. Graphics output devices are very limited on all three systems.

8. I have found it nearly impossible to access the data that I proposed to study, and am instead mainly working on data that I brought along and on finishing a project started by my research advisor before my arrival.

Comments: I find that I am not introduced to visiting scientists and am not informed of their visits until after their departure. I feel that meeting visiting colleagues is an important opportunity which should not be overlooked.

Brief resume of progress: I completed two papers that were in progress at start of tenure. These will appear in the Aug. 15 and Sept. 15 issues of the Astrophysical Journal. I am currently writing a paper on work done since arrival, to be submitted at the end of this month. I attended a meeting on "The Physics of Accretion onto Compact Objects" held in Tenerife where I gave a talk and presented two poster presentations. One of the presentations was on work done entirely since my arrival. The meeting at Tenerife led to two collaborations, one with scientists at MIT and ESOC and one with groups at the CfA and MIT.

General impressions: The funding to attend meetings has been a tremendous asset. The Tenerife meeting gave me the opportunity to meet, many for the first time, scientists currently active in my field, and to obtain information on work that will not be published for at least a year.

Suggestions: The availability of office space is very important to getting work done. Adequate computer facilities, and documentation for existing programs, are essential. One should be allowed to work on proposed research (which is supposedly also of interest to the Laboratory) rather than having to finish up old projects.

CT/P.H/RC

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED
NRC-Associateship Office
AUG 18 1986

Date: 8 August 1986

Associate Name: Geoffrey Kurt James

Laboratory: Jet Propulsion Laboratory

Location: Pasadena, California

Starting Date of Tenure: January 30, 1986

Adviser Name: Dr. J. M. Ajello

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

C1/7-17/R

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED
NRC-Associateship Office
AUG 18 1986

Date: 8 August 1986

Associate Name: Geoffrey Kurt James

Laboratory: Jet Propulsion Laboratory

Location: Pasadena, California

Starting Date of Tenure: January 30, 1986

Adviser Name: Dr. J. M. Ajello

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3. If requested, was the stipend advance available when you began tenure?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Is the stipend being received regularly in a timely way?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6. Are your questions to this Office being handled courteously and efficiently?	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments:

over...

2/5/85

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NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

RECEIVED

JUN 30 1986

ASSOCIATESHIP
OFFICE

Date: 24 June 1986

Associate Name: Kevin Odell Pope

Laboratory: NASA/JPL

Location: Pasadena, CA 91109

Starting Date of Tenure 3 December 1985

Adviser Name: Dr. John P. Ford

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory?	<u>X</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u>X</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>XX</u>	<u> </u>

Comments: No complaints, everything is running smoothly.

over...

2/5/85

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u> </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u> </u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u>X</u>	<u> </u>

Comments:

#4 Although I have easy access to the main computer in our group, I wanted a PC in my office for report and letter writing which was not available. #8 Communication between group members (other than my advisor) was slow at first and it took me several months to learn what everyone was doing. A more formal program of introduction to learn what everyone was doing. A more formal program of introduction would help.

Brief resume of progress: During the first six months of my fellowship I gathered the available remote sensing data for a large part of the Yucatan peninsula. I have completed a preliminary ecosystem classification of a portion of Belize, based on radar, Landsat, and color IR data. Between May 6 and May 21 I traveled to Belize to verify my remote sensing interpretations and I am currently working on modifying my classifications with the help of the field data and beginning the write-up of my research.

General impression of program to date:

The program has provided me with an excellent opportunity to pursue original research. However, it is difficult to carry any project from conception to publication in one year.

Suggestions:

I think the program would benefit from offering one and two year fellowships so that an associate could have the option of planning a two year program from the onset.

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JUN 16 1986

ASSOCIATESHIP
OFFICE

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS

SIX-MONTH PROGRESS REPORT

Date: 06/10/86

Associate Name: Jouko Heikki Salo

Laboratory: Jet Propulsion Laboratory

ms. 133-501
Location: 4800 Oak Grove Dr
Pasadena CA 91109

Starting Date of Tenure 02/12/85

Adviser Name: Alan Harris

I. Associateship Office Functions

	<u>Yes</u>	<u>No</u>
1. Were the pre-start materials and instructions satisfactory? Ⓚ	<u>X</u>	<u> </u>
2. If requested, was the relocation and travel advance handled in a satisfactory manner?	<u>X</u>	<u> </u>
3. If requested, was the stipend advance available when you began tenure?	<u>X</u>	<u> </u>
4. Is the stipend being received regularly in a timely way?	<u>X</u>	<u> </u>
5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily?	<u>X</u>	<u> </u>
6. Are your questions to this Office being handled courteously and efficiently?	<u>X</u>	<u> </u>

Comments:

Ⓚ I didn't receive the starting material in time by mail.

over...

II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u> </u>	<u> X </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u> X </u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u> X </u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u> X </u>	<u> </u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u> X </u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u> X </u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u> X </u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u> </u>	<u> X </u>

Comments:
 There is continuous practical and other problems in having access to computer facilities.
 e.g. it took over 2 months to get a telephone line.

Brief resume of progress:

I have almost completed two manuscripts related to the proposed research plan, and plan to submit them within one month. Some results have also been published in house or elsewhere. At the moment I am developing two new simulation programs, and it should be possible to get some preliminary results within next few months.

General impression of program to date:

There is not too much cooperation or help from the laboratory, but otherwise positive impression.

Suggestions:

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JUL 3 1986

ASSOCIATESHIP
OFFICENATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMSSIX-MONTH PROGRESS REPORT

Date: 27th June 1986

Associate Name: John MORTON

Laboratory: NASA LaRC

Location: Hampton VA 23665 (Impact Dynamics Branch)

Starting Date of Tenure 6th January 1986

Adviser Name: Dr J.H. Starnes

I. Associateship Office FunctionsYes No

- | | | |
|---|------------|----------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>✓</u> | <u>—</u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u>N/A</u> | <u>—</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u>N/A</u> | <u>—</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>✓</u> | <u>—</u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>✓</u> | <u>—</u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>✓</u> | <u>—</u> |

Comments:

There was some confusion in the pre-starting correspondence which, at the time, was disturbing. I rather feel, however, that this was an isolated incident arising from a most unfortunate and unavoidable lack of communication.

over...

2/5/85

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II. Laboratory functions

Yes No

1. Was the laboratory ready to receive you and help you get started? ✓ —
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory? ✓ —
3. Is the space assigned reasonably adequate? ✓ —
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support?
If so, explain below. — ✓
5. Are you being encouraged to plan for publication of your research results in referred journals? ✓ —
6. Are you able to participate in local seminars, colloquia, etc.? ✓ —
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings? ✓ —
8. Have you encountered laboratory influences detrimental to your proposed research? Explain. — ✓

Comments: I have received every help and encouragement from everyone in the NASA branch and in Administration. They have done much to make my stay effective and enjoyable!

Brief resume of progress: Progress has, fortunately, followed closely that mapped out in the proposal. One preliminary (computer scaling) problem has been addressed and solved. One part of the larger cylinder crushing problem has also been solved while the remaining model is under development. The study has also opened up a number of problems which need treatment.

General impression of program to date: This one, he divided into two parts -

- (a) The application phase: seems to be involved and administratively unwieldy
- (b) Tenure
 - (i) Technically NASA is well used and able to look after Associates
 - (ii) administration there is an efficient chain of communication between NASA and NRC which works well.

Suggestions:

One very small point. Can some way be found around the problem of postage for official correspondence? It is tedious to have to take mail to the post office after work.

NATIONAL RESEARCH COUNCIL
ASSOCIATESHIP PROGRAMS
SIX-MONTH PROGRESS REPORT

RECEIVED

JUL 7 1986

ASSOCIATESHIP
OFFICE

Date: July 3, 1986

Associate Name: Douglas Wayne Ming

Laboratory: NASA/JSC

Location: Houston, Texas

Starting Date of Tenure January 6, 1986

Adviser Name: Dr. Richard J. Williams

I. Associateship Office Functions

Yes No

- | | | |
|---|-------------|-------------|
| 1. Were the pre-start materials and instructions satisfactory? | <u>X</u> | <u> </u> |
| 2. If requested, was the relocation and travel advance handled in a satisfactory manner? | <u> </u> | <u>NA</u> |
| 3. If requested, was the stipend advance available when you began tenure? | <u> </u> | <u>NA</u> |
| 4. Is the stipend being received regularly in a timely way? | <u>X</u> | <u> </u> |
| 5. Are Travel Requests and travel reimbursements being handled promptly and satisfactorily? | <u>X</u> | <u> </u> |
| 6. Are your questions to this Office being handled courteously and efficiently? | <u>X</u> | <u> </u> |

Comments:

over...

2/5/85

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II. Laboratory functions

	<u>Yes</u>	<u>No</u>
1. Was the laboratory ready to receive you and help you get started?	<u>X</u>	<u> </u>
2. Is your interaction with your research adviser and the NRC Laboratory Program Representative satisfactory?	<u>X</u>	<u> </u>
3. Is the space assigned reasonably adequate?	<u>X</u>	<u> </u>
4. Are you experiencing any problems with access to equipment, computer time, supplies, technical support? If so, explain below.	<u> </u>	<u>X</u>
5. Are you being encouraged to plan for publication of your research results in referred journals?	<u>X</u>	<u> </u>
6. Are you able to participate in local seminars, colloquia, etc.?	<u>X</u>	<u> </u>
7. Are you encouraged to plan for attendance at appropriate national and/or regional meetings?	<u>X</u>	<u> </u>
8. Have you encountered laboratory influences detrimental to your proposed research? Explain.	<u> </u>	<u>X</u>

Comments:

Brief resume of progress:

My research effort on the synthesis of zeolites from lunar analog materials is well underway. I have been successful in synthesizing a variety of zeolites. Presently, I am refining the procedures for synthesizing monomineralic zeolites and characterizing the materials that have been synthesized.

General impression of program to date:

I am pleased with the way the program has progressed to date. I have found the people at NASA/JSC and NRC headquarters very helpful in responding to problems or questions that have occurred. This program is excellent in catering to the research interests of the NRC research associate because of the freedom the program allows the associate to pursue those interests.

Suggestions: